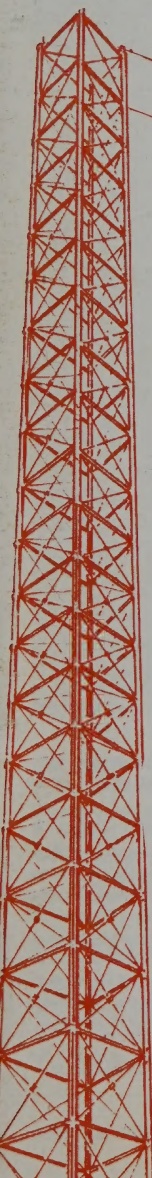
THE OTB

THE OLD TIMER'S BULLETIN MAY 2001 VOL. 42 / #2

OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

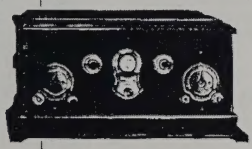
Published for the collector, historian and old-time radio operator



From an advertisement reproduced in Radio Manufacturers of the 1920s *by Alan Douglas*

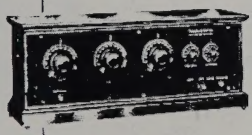
A Beautiful Receiver with a Telephonic Heritage

RADIO engineering is telephone engineering once the signal enters the receiver. In other words—how far you hear, how much you hear, how accurately you hear, depends upon the same principles as those used in the construction of the telephone.



No. 601 Table Model—6-tube; totally shielded, dual control; voltmeter; takes new tube bases; operates either horn or cone type loud speaker; Solid Mahogany.

For more than 30 years Stromberg-Carlson has been making high grade telephone equipment, and the reason that this equipment has constantly met the exacting standards of public utilities, is because every worker in the Stromberg-Carlson plant has realized that his work was of vital importance; has taken pride in so performing his task that Stromberg-Carlson quality would be assured.



No. 1 Type Table Model. 3-tube; has antenna coupling switch; also key for switching from first audio to second audio frequency amplifier. Solid Mahogany.

Radio apparatus and the Telephone are so intimately related that with this experience and *esprit de corps*, Stromberg-Carlson engineers and craftsmen have been able to produce Radio Receivers that are the delight of enthusiasts everywhere.

The unexpected range of these receivers—their startling fidelity of tone—their simplicity—as well as their durability and freedom from trouble come from this telephonic heritage.

Ask your dealer to show you NEUTRODYNE the latest Stromberg-Carlson Receivers

Stromberg-Carlson Telephone Mfg. Co.
Rochester, N. Y.

Chicago Kansas City Toronto

Stromberg-Carlson

Makers of voice transmission and voice reception apparatus for more than thirty years

ANNUAL CONFERENCE TO FEATURE STROMBERG-CARLSON

SEE PAGE 18

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.
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The Vacuum Tube
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FROM THE EDITOR

For a couple of important reasons, this issue isn't as full of feature articles as I'd like to make it. The first reason can be seen on our cover: it's time to make room in the for that all-important Conference preview! You'll find the usual advance information on hotel reservations, museum hours, seminars, and those all-important contest categories. The second reason, as discussed by President Fizette in his message, is that we are publishing certain club information that our Directors and Officers would like to put in your hands. The financial information, board meeting minutes, and contact information he mentions will be found in the "AWA News" section.

Included along with that information for you is a request for information we'd like to get FROM you. I'll repeat it here because it's important. If you have internet access, we'd like for you to visit our web site at http://www.antiquewireless.org, click on "Members Please Check In!" on the main menu, and fill in the name and e-mail address blanks as directed. The reason: we want to get an estimate of how many members are able to access the site. With the number of internet-equipped people increasing so rapidly, the site will soon become an important tool for member communications. As most of you know, it is now used primarily as an outreach tool to introduce AWA to people who don't know us.

Finally, I need to mention that Bill Denk—having reached an age when he figures he doesn't need to be worried about publication deadlines—has decided to retire as our book Review Editor. David Kraueter, who has served as Editor and book reviewer for the *Pittsburgh Oscillator* of the Pittsburgh antique Radio Society and is Interim Head Librarian for the U. Grant Miller Library of Washington and Lee University (Washington, PA), has agreed to take over the reins. Full details will be found in the Book Review column. So thanks very much for your contributions to *The OTB* over the years, Bill, and welcome to our pages, David!

—MFE

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB *staff or the Antique Wireless Association.*

1929 STEREO RECORDINGS

Mechanical television has always fascinated me. I especially enjoyed the articles by McLean and Rybak in the February *OTB* which discuss early video signals recorded on 78 rpm phono discs, but successfully played back only with recent technology. That reminded me of a program on our local college FM station, WRPI, some years ago featuring stereo music recorded in 1929. It seems that recording studios often set up two completely independent systems, from microphone to turntable, when recording orchestras. This provided insurance against expensive repeat performances in the event of equipment failure. The two microphones were apparently set a foot or so apart due to the base size of the microphone stands. These 78 rpm masters were found in record company vaults, and someone had the idea to play them back simultaneously through left and right stereo channels. I believe playback speed and phasing may have been manipulated during re-recording. These unintentional 1929 stereo recordings sounded amazingly good, much better than monaural recordings from the same period.

CHUCK PORTER
Troy, NY

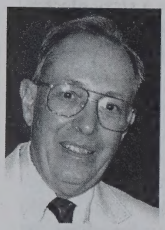
OOPS DEPARTMENT

Thanks very much for the copy of the MAY 2001 *OTB*. My article *[Playing Back the Earliest Known Video Recordings]* looks well laid-out and I'm pleased with its presentation. It's just a pity that both the table of contents and "From the Editor" refer to me as "David." Oh well, these things happen.....

DONALD F. MCLEAN
via e-mail

THE PRESIDENT'S MESSAGE

This is the beginning of the AWA outdoor and conference season here in the north, and since there still appears to be some confusion as to just who and what we are, and what we do, a few words might be in order. Much of what follows may look familiar; it should, as it was printed on page 5 of the November, 1999 *OTB*.



What and who we are: The AWA is an association of people who have come together to pursue and enjoy the many facets of the story of "old radio." Our goals are to promote research and documentation of the history of radio and wireless technology, and to preserve and restore the artifacts of this history.

What we do: We publish some 500 pages of material each year. We support a world-class museum with an active outreach program. We sponsor chapters and regional meets. We provide an Annual Conference of members. This has a full slate of programs and activities, including a flea market, extending from Wednesday through Saturday.

The Conference: The format of our conference has been established over the years and has been very successful. We try to find something for everyone who attends, and the attendance has been high every year. In the early days, we convened at Canandaigua, NY, and for many years the site was adequate. Then, with growth, we were forced to find another suitable location not only within an acceptable distance from our museum and other hotels, but also convenient for the volunteers who put the meeting on.

The Thruway Marriott at Rochester has worked very well for us, although in recent years our continued growth has created parking problems. Our Conference committee, working with the hotel, chose the only options that were open: restricting parking to hotel guests and flea market sellers and initiating a regular shuttle service to and from the other hotels.

This has not only worked well, but has precluded some serious safety problems. The local fire marshal, who one year almost shut down the flea market because parking congestion blocked the fire lanes, was satisfied by the new policies. And I think it is fair to say that we are still at least as accessible as most major meets of this kind.

We all agree that it would be ideal to have the Conference at a hotel with facilities similar to those of the Marriott, but with much more space outdoors for parking and the flea market. We have yet to locate a place that has such space, offers adequate meeting and guest room space, and is suitably located.

Another point of contention is that the conference is open only to members, and not to the general public. The reason for this is simple; we can't get a permit from the town of Henrietta otherwise. If we could get a permit for such an arrangement, flea market sellers would the have deal with the paperwork of charging and reporting state sales tax.

While we realize that we can't be everything to everybody, the bottom line is that we are doing the best we can with what we have to work with.

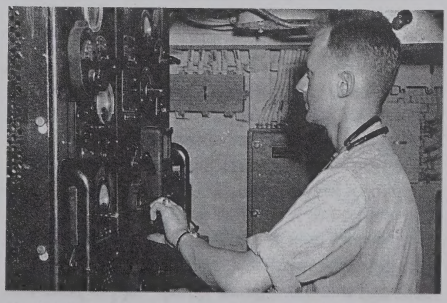
Information for Members: Elsewhere in this issue we are publishing AWA financial information and a summary of the minutes of the November board meeting. There is also a listing of the board members and officers, along with information about how to contact them.

Are you sure your name isn't David? Seriously, we apologize and are happy we at least managed to get it right on the article itself and in our "About our Authors" column.

Readers who were fascinated by Don's article will want to look at the review of his new book Restoring Baird's Image, *recently published by the IEE, in this issues's book review column.*

NAVY STORIES

The article on USS *Ling* in the February issue of *The OTB* caught my eye and brought back a



Rod Schrock at the controls of his TBL.

few memories of my hitch in the Navy. I was on a Fletcher-class destroyer (USS *Leary* DDR879) from 1953 to 1956. We had the RAK receiver and a TBL transmitter in our starboard emergency radio room. The RAK was on continuously and monitored VLF RTTY. Once set up it stayed on for months. The LF portion of the TBL was used for harbor masters, some aircraft, etc. It was usually on HF. The enclosed picture is a Navy "glamour shot" of me tuning a TBL in the main transmitter room. Thanks for the memories!

RODNEY K. SCHROCK, KD3OR
Somerset, PA

That explains something I've always wondered about. I have run into very few weak tubes during my radio restoration adventures, but all four 6D6's in my own RAK tested quite low when I got it. And while there's no sign of a short or serious leakage, a quantity of wax had drooled out of the power transformer (which is otherwise OK) onto components below. I don't have to wonder anymore if, in its past, my set had been left on 24/7 for months at a time!—MFE

This story is for the many Navy men who read *The OTB*. My boss Don, who had been a radio operator on a submarine during World War II, told me about it years ago. How true it is, I don't know. During a training exercise, the submarine was lying immobilized on the bottom because the ultrasound receivers were picking up what seemed to be the screws of a searching battleship. Suddenly Don realized what they had been listening to for the past two hours. He took a screwdriver and carefully and quietly removed the clock from the bulkhead wall in the radio room. Thereupon, the captain yelled: "They're gone!" and the sub was able to return to port. To this day, the captain has never been told that he had been listening to the bulkhead clock.

ALTON A. DUBOIS
Queensbury, N. Y.

MORE ON TESLA

As Henry Bradford pointed out, it would be difficult to repeat Tesla's large scale experiments today. However, Tesla's discoveries came, at first, from observing very small effects and investigating them. This approach was similar to the Hertz's observation of the tiny spark in the gap of his receiving loop; not a very impressive effect but it led to the whole radio industry. One item Tesla mentioned was that he could charge capacitors at a distance. He apparently deduced this from small effects that anyone can observe, such as the following:

Take two sheets of kitchen aluminum foil about 1' × 2', separate them with a thin sheet of plastic, and lay them on a flat surface aligned on a north-south axis. Connect a digital millivoltmeter across this capacitor. Move a fairly heavy book rapidly from East to West and back across the capacitor and just above it. The meter will read a few millivolts positive in one direction and negative in the other. This could be dismissed as a stray electrostatic effect except that the readings are of different polarity in opposite directions. I don't know why this happens except that one direction is with the rotation of the earth and the other against it.

Any capacitor can detect motion above it and a capacitor of any size will be found to have a small charge on it even if it has not been used for years. Apparently this is the same effect that can collect a dangerous voltage on a length of the new Category 7E telephone wire. A dielectric rotated between charged plates will create a magnetic field and a dielectric rotated in a magnetic field will cause a charge on the plates.

This is one of several examples that could be quoted, few of which appear in textbooks. Many of the discoveries made by early researchers apparently have been forgotten and are now unknown.

J. M. TWOSE
Toronto, Ont., Canada

An anonymous reader sent in the following excerpt from a review of the book Tesla: Master of Lightning *by Margaret Cheney and Robert Uth (Barnes & Noble, 1999) that appeared in* Test & Measurement World *for February, 2001.*

Although Heinrich Hertz first showed the transmission of an electrical signal through the air, it was Tesla who first demonstrated the combined fundamental components of a "radio" as we now know it. And Tesla patented his technology several months before Marconi, the man who today many consider the inventor of radio. Thus it was with Tesla, always ahead with ideas but late to realize a payoff or glory. Only after Tesla's death—and after his patents has expired—did the courts recognize him as radio's inventor.

BLEEDER NEEDED

On the "Super-Simple RF Generator" ("Breadboarding," Feb. *OTB*, p. 42): Let's think in terms of a safety bleeder resistor across the 40-mike capacitor, of, say, 220 K, 2 watts. Gotta keep beginning *OTB* readers unzapped!

LUDWELL SIBLEY
via e-mail
I am a firm believer in bleeder resistors and will

(continued on page 16)

AWA NEWS

***OTB* POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

MAY 5
AWA Spring Meet

MAY 5
Semi-Annual Board Meeting

MAY 18-19
Radio Daze 2001

JUNE 8-9
IHRS/AWA 30th Spring Meet

AUGUST 11
NWFA/AWA Meet

SEPTEMBER 5-8
AWA Annual Conference
(see page 18)

NOVEMBER 11
Membership Meeting followed by Semi-Annual Board Meeting.

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

AWA SPRING MEET

May 5

The exciting annual AWA Spring Meet at the Museum Annex, still at NO admission charge, is again the first Saturday in May. Featuring a large flea market, the famous sale of junque from the AWA warehouse with even more exciting items this year, a commission-free member auction, special event prices on sale of AWA publications and CDs and by popular demand... the legendary roast beef dinner provided on-site by the American Legion. The schedule is:

7:00 a.m. to Noon: Flea market. $3.00 charge for parking space. New, larger paved parking lot!

9:00 to 11:00 a.m.: Annex tag sale. More stuff than ever in all categories.

11:00 to Noon: Annex guided tour. Flea market and Annex sales continue.

Noon to 1:00 p.m.: Famous Legion Lunch. Limited space, buy tickets early at only $9.00 each.

1:00 to 2:00 p.m.: Member's buyer to seller no fee auction. Colonel Ed Gable, Auctioneer.

2:00 to 3:00 p.m.: Museum open. AWA Board Meeting

Location: AWA Annex Building, 6910 Rte. 5&20 (near intersection with Rt. 444), Bloomfield, NY—on the grounds of the American Legion Post. Questions to Ed Gable, Museum Curator, at (716) 392-3088 or k2mp@eznet.net

RADIO DAZE 2001

May 18-19

Presented by Northland Antique Radio Club and the Pavek Museum at the Comfort Inn of Plymouth, 3000 Harbor Ln., Plymouth, MN 55447. Info: Jim Thompson (RadioJim@worldnet.att.net) or Kip Wallace (KipWallace@dl-inc.com).

VINTAGE TECHNOLOGY(BLACKPOOL SPRING FAIR)

May 20

The world of old radios, gramophones, music machines, telephones, records and scientific instruments comes to Blackpool (UK) again. Seaside location at the De Vere Hotel, Leisure Center and golf course. Event runs 9 a.m. to 4 p.m. Tables £35. Information: Vintage Technology, 173 Newton Dr., Blackpool FY3 8ND, UK Tel: 01253 300100 Fax: 01253 300020 e-mail vintage @ blackpool.net

IHRS/AWA 30TH REGIONAL SPRING MEET

June 8-9

New Location: Hancock County Fairgrounds, Greenfield, IN, 9 miles east of Indianapolis. I-70 at State Rd #9. Exit 104. This site is mostly under roof. Located on Apple St. about 2 blocks N. of US-40 and 1/2 mile E. of SR-9. (Just north of our Fall Foliage meeting place.) Water and electric hookups available for nominal fee. Contest categories: 1) Radios made in Indiana, 2) Speakers, 3) Colorful radios, 4) Factory-made crystal sets and 5) "Open" category. There will be Silent Donation and Consignment auctions. Motels: (All located South of I-70 on SR-9) Lee's Inn, 2270 N. State St., 317-462-7112 or 1-800-733-5337. Super-8, 2100 N. State St., 317-462-8899 or 1-800-800-8000. Comfort Inn, 178 Martindale Dr., 317-467-9999 or 1-800-228-5150. Holiday Inn Express, 2070 N. State St., 317-467-0999. Dollar Inn, 2180 N. State St., 317-457-0067. Info: Glenn Fitch, 765-565-6911 or Herman Gross, 765-459-8308, w9itt@mindspring.com

RADIOACTIVITY 2001

June 14-16

The annual late spring antique radio mega-meet hosted by the Mid-Atlantic Antique Radio Club

is coming. Flea market opens Thursday at noon; tubes, parts, ephemera auction that evening. Old equipment contest, seminars, banquet on Friday. Old radio appraisal Saturaday morning, big auction in the afternoon. Preregistration (must be mailed before June 2) $5; $10 at door (spouses and children free); flea market spaces, $10. Location same as last year, at the Sheraton College Park in Beltsville, MD. A block of rooms is available at $87.00 single or double (group ABQ, cutoff date May 14, (301) 937-4422). I-95 exit 29B southwest corner of interchange. To preregister or for more info contact Brian Belanger, 5730 Avery Park Dr., Rockville, MD 20855-1738, (301) 258-0708 or visit www.maarc.org

EXTRAVAGANZA '01

July 6-8

Sponsored by Michigan Antique Radio Club. At the Holiday Inn South Convention Center, 6820 S. Cedar St., Lansing, MI 48911. Huge 3-day open-air flea market starts Friday. Saturday auction, equipment contest (all wave sets), four programs, more. Family registration $15 (MARC members), $23 (non members). Outdoor flea market space: first space $10; additional $10 each; 8' table rental $10 each. Spaces under the tent: 8' table with 2 chairs $20 each. For info or registration, contact Don Colbert, 22400 Nowin, Dearborn, MI 48124, e-mail donsradio@aol.com, or visit www.antiqueradios.com/ marc.

ARCI RADIOFEST XX

August 1-5

Presented by the Antique Radio Club of Illinois at the Ramada Hotel, 345 River Rd., Elgin, IL 60123. Large radio swap meet, contest, presentations, donation auction, and much, much more. Auction of the superb radio collection of the late Dr. Ralph Muchow to be held during the meet (see separate announcement below). For more info: contact ARCI at P.O. Box 1139, La Grange Park, IL 60526, e-mail ARCI at arci31280@aol. com, or visit http://members.aol. com/arci31280/ arci.htm

RALPH MUCHOW ESTATE AUCTION

August 3-5

To be held at the Hemmins Cultural Center in downtown Elgin, IL. Three separate sales: tubes and radio advertising items on August 3rd beginning 4 p.m.; radios on August 4th beginning 10 a.m.; conclusion of radio sale on August 5th beginning at 10 a.m. Auction by Estes Auctions, 7404 Ryan Rd., Medina, OH 44256. Phone (330) 769-4992; fax (330) 769-4116; e-mail: estesauctions@ aol.com. Preview at http: //www.homestead.com/estesauction

NIAGARA FRONTIER WIRELESS ASSOCIATION

August 11

Joint meet with the AWA and our largest of the year. At the Amherst Museum, Amherst, NY. From the NY State Thruway, take Exit 49 (Transit Rd., Rt. 78) north nine miles. Left on Tonawonda Creek Rd. just before entering Niagara County (there is also a Tonawonda Creek Rd. in Niagara County on the North side of the creek). Proceed two miles west to the museum. The meet is outside just west of the buildings. There are lots of motels and restaurants at Thruway Exit 49. Flea market 8 a.m. to noon. Museum exhibits open 11:30 (there's a full room of early radios and TVs). Bring items for the auction beginning about 11 a.m., which will also include the few remaining items from the John Myers estate. There will also be a donation auction. A talk related to early radio will be given at about 12:30. Contest categories: 1. Any battery-powered 1920s radio; 2. Any AC-powered radio; 3. Any tube in original box; 4. Any radio in original box 5. Open category—any radio or radio related item. Entry fee for non museum members is $7.00. Spouses $2.00. Includes annual NFWA membership and museum admission. No additional fees to sell or for any other activity. Lunch available. For info, call Larry Babcock at (716) 741-3082 or Gary Parzy at (716) 668-2943.

AWA MEMBERSHIP AND BOARD MEETING

November 11

At Rochester Thruway Marriott. Take Thruway (I-90) Exit 46, then I-390 north to NY 253 West to NY 15 South. Membership meeting at 1 p.m. (open to any interested member) followed by Semiannual Board Meeting.

Special Member Information Section

Summaries of the November, 2000 AWA Membership Meeting and the Combined AWA Board of Directors/AWA Electronics Communications Museum Board of Trustees Meetings.

Membership Meeting

Meeting was held at the Thruway Marriott Inn, Rochester, NY on Nov. 5, 2000, at 1 p.m. Present were 16 directors, the acting recording secretary Pat Muehlbauer, and member Charles Bliley. Ron Frisbie reported on the proxy vote for ratification of the November 1999 election of

directors. The vote was 705 for, 1 against, with 11 abstentions. Motion to accept was passed. The ratification of the actions by the Board prior to November 2000 was passed.

Seven nominees for the class of directors and trustees whose terms expire in 2003 were Larry Babcock, Geoffrey Bourne, Marc Ellis, Ronald Frisbie, Edward Gable, Richard Neidich, and Elmer Wagner. The proxy vote was 699 for, 2 against, with 16 abstaining. The motion to re-elect these nominees was made and carried.

The independent accountants were ratified by proxy vote, with 699 for, 2 against, and with 16 abstentions. Hebron and Hebron of Rochester have been selected as the accountants for the AWA.

The secretary's report of the meeting of November 7, 1999 was accepted. A report of the informal membership forum held at the 2000 Annual Conference was given by Geoff Bourne. Some of the subjects touched on were the release of financial information, election of directors, publishing of by-laws, income sources for AWA, and the annual conference. The membership meeting was adjourned at 2:18 PM EST.

Meeting of the AWA, Inc. Board of Directors and the AWA Electronic Communications Museum Board of Trustees

Meeting was held at the Thruway Marriott Inn, Rochester, NY, on Nov. 5, 2000, and called to order at 2:19 p.m. All those who attended the membership meeting were present.

Announcement made that the position of Museum Director has been filled by Tom Peterson who will work with Ed Gable, the Curator. Reports by the secretary, the treasurer, and the president were given. The president announced that a Rochester attorney specializing in not-for-profit law, Robert Scutt, has been retained to oversee the legalities of our organization structure and to work on the procedure to follow for the separation of the AWA club and the Museum to help us realize our permanent charter for the Museum from the State of New York.

The membership secretary reported on current membership: US 3476, Canadian 152, foreign 142, for a total of 3770, down 93 from May 2000. The website has become the main source for new members.

The Conference 2000 was reported on, with special thanks to those members who put in so much work, before, during, and after, in making the four-day event successful. Also reported on were ten AWA sponsored and co-sponsored regional meets held during 2000. The 2001 Conference will be held at the Rochester Thruway Marriott, on Sept. 6-9. The theme will be Stromberg-Carlson. Programs for the meet are being assembled, and an overview was presented.

Marc Ellis reported on *The OTB* and the CD-ROM project, just completed. Geoff Bourne will supervise the marketing of the CDs. The new *AWA Review* editor will be member Tom Perera. Sales for Volume 13 were reported as brisk. A report to the board by Internet Editor Chuck Schwark stated that hits to the site were steady and that foreign hits were increasing.

The Museum report was given. The problem of where to house the Museum items by 2005 when our lease with the Historical Society runs out was discussed, and the curator was requested to prepare a feasibility study to be presented at the May board meeting.

The budget for 2001 was presented by the finance committee. Three AWA members have donated a total of $7000 to help defray legal expenses. Work on the upgrading of the by-laws continued with work sessions during the summer. Discussions were also held on the subjects of the Houck Awards (guidelines to be presented at May meeting), a proposal for issuing CD ROMS of past *AWA Reviews* (board authorized study of preparation of Volumes 1-5, to be presented at May board meeting), making financial information available to AWA members (will be published in the May *OTB* following IRS guidelines), raising dues (decided to wait for split of club and Museum), life membership (percentage of members to be limited), advertising (more widespread advertising to boost membership to be resumed, with a budget not to exceed $3000).

The Board meeting was adjourned at 6:50 p.m.

Call For Papers For *AWA Review* Volume 14

Papers are now being accepted for the next *AWA Review*, to be published in 2001. To expedite matters, a brief summary of the material should be sent to the editor:

Thomas B. Perera, W1TP
11 Squire Hill Rd.
North Caldwell, NJ 07006
tomperera@w1tp.com

Antique Wireless Association, Inc.
Statement of Activities

NOVEMBER 1999 THROUGH OCTOBER 2000

Ordinary Income/Expense	Nov '99-Oct '00
Income	
6007C.MISCELLANEOUS INCOME-CLUB	4,207.09
6010C.CLUB MEMBERSHIP DUES	53,421.00
6020C.INT ON BANK ACCOUNTS-CLUB	28,188.17
6025C.DISPLAY ADS IN OTB-CLUB	100.00
6033C.TUBE AUCTION PROCEEDS	1,627.00
6034C.COMMUNICATIONS AUCTION PROCEEDS	275.20
6035C.GENERAL AUCTION PROCEEDS	21,560.73
6036C.CONTRIBUTIONS-CLUB	368.20
6045C.SALES	1,832.55
6800.CONFERENCES	24,196.00
Total Income	135,775.94
Cost of Goods Sold	
8110C.COST-AWA REVIEW 13 SOLD	9,960.53
Total COGS	9,960.53
Gross Benefit	125,815.41
Expense	
8000C.OTB EXPENSES	45,944.24
8001C.BANK SVC CHARGE	700.41
8004C.HF CONTESTS	102.88
8014C.COMPUTER SUPPLIES	467.02
8016C.COMPUTER SOFTWARE	652.94
8030C.INSURANCE-OFF. & DIR. LIAB.	790.30
8041C.OTB CD-ROM PROJECT	1,266.59
8042C.OTB & REVIEW INDEX	480.00
8055C.POSTAGE MACHINE & MAILING	1,505.31
8065C.OFFICE SUPPLIES-CLUB	1,428.96
8067C.ACCOUNTING	3, 721.00
8068C.LEGAL	3,690.15
8070C.BAD CHECKS	15.00
8060C.GENERAL POSTAGE-CLUB	559.37
8091C.BOARD MEETING COSTS	173.52
8092C.BOARD MEETING TRAVEL	143.00
8115C.ADVER. AND PHOTOGRAPHY	1,335.93
8120C.COPYRIGHT	355.00
8160C.TELEPHONE-CLUB	1, 119.50
8190C.SALES TAX	3.83
8191C.MISC. EXP.-CLUB	192.75
8192C.AOL SERVICE-SECRETARY	379.42
8300.CONFERENCE EXPENSES	56,331.08
8300C.CONFERENCE	75.00
8060M.GENERAL POSTAGE	0.00
8065M.OFFICE SUPPLIES	0.00
Total Expense	121,433.20
Net Ordinary Income	4,382.21
Other Income/Expense	
Other Income	
9000.TRANSFER TO MUSEUM	469.50
9500.Unrealized Gain (loss) on Inves	30,408.72
Total Other Income	30,878.22
Net Other Income	30,878.22
Net Income	**35,260.43**

Antique Wireless Association, Inc.
Balance Sheet

AS OF OCTOBER 31, 2000

Assets	Oct 31, '00
Current Assets	
Checking/Savings	
1078.MARINE MIDLAND CHECKING-CLUB	4,352.02
Total Checking/Savings	4,352.02
Accounts Receivable	
1300.ACCOUNTS RECEIVABLE	3,630.00
Total Accounts Receivable	3,630.00
Other Current Assets	
Certificates of Deposit	219,674.74
1400.PREPAID EXPENSES	6,143.75
Total Other Current Assets	225,818.49
Total Current Assets	233,800.51
Other Assets	
1199.DUE TO/DUE FROM	-49,419.65
1200.MARKETABLE SECURITIES	262,661.06
Total Other Assets	213,241.41
Total Assets	447,041.92
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
3030.DUES PAID IN ADVANCE	12,450.00
3032.OTB	4,100.00
3095C.DUE TO MUSEUM	6,000.00
Total Accounts Payable	22,550.00
Total Current Liabilities	22,550.00
Long Term Liabilities	
3800.RESERVES	5,990.10
Total Long Term Liabilities	5,990.10
Total Liabilities	28,540.10
Equity	
3000.Opening Bal Equity	181,551.15
3500.Prior Period Adjustment	-29,790.82
3900.Retained Earnings	231,481.06
Net Income	35,260.43
Total Equity	418,501.82
Total Liabilities & Equity	**447,041.92**

AWA Electronic Communication
Museum Statement of Activities

NOVEMBER 1999 THROUGH OCTOBER 2000

Ordinary Income/Expense	Nov '99-Oct '00
Income	
6805M.AWA PUBLICATION INCOME	5.00
6007M.MISCELLANEOUS INCOME-MUSEUM	829.00
6008M.CONTRIBUTIONS-BUILDING	100.00
6025M.DISPLAY ADS IN OTB-MUSEUM	780.00
6036M.CONTRIBUTIONS-MUSEUM	691.25
6039M.SPRING MEET INCOME	2,329.15
6040M.CONFERENCE FLEA MARKET SALES	758.00
6041M.OLD CONF. OTB/REVIEW BK SALES	526.00
6801M.EBAY SALES	434.72
6802M.OLD OTB & REVIEW SALES	14,553.60
Total Income	21,006.72
Cost of Goods Sold	
8107M.COST-AWA REVIEW 6 SOLD	2,094.96
8108M.COST-AWA REVIEW 7 SOLD	3,174.85
8109M.COST-AWA REVIEW 8 SOLD	2,432.02
8111M.COST-AWA REVIEW 9 SOLD	402.74
8112M.COST-AWA REVIEW 10 SOLD	433.68
8113M.COST-AWA REVIEW 11 SOLD	860.82
8114M.COST-AWA REVIEW 12 SOLD	3,065.96
Total COGS	12,465.03
Gross Benefit	8,541.69
Expense	
8192C.AOL SERVICE-SECRETARY	67.94
8091C.BOARD MEETING COSTS	16.33
8001C.BANK SVC CHARGE	0.00
8001M.BANK SERVICE CHARGE	40.95
8010M.DEPR ON COMPUTER	528.38
8014M.COMPUTER SUPPLIES-MUSEUM	73.99
8016M.COMPUTER SOFTWARE-MUSEUM	1,263.27
8022M.DEPR. ON ANNEX	3,414.74
8025M.MUSEUM SUPPLIES	105.18
8030M.INSURANCE-FINE ARTS COLLECTION	4,926.70
8031M.INSURANCE-FIRE,THEFT-MUS,ANN.	960.99
8060M.GENERAL POSTAGE	338.90
8061M.GROUNDS KEEPING	455.85
8062M.GAS	988.07
8063M.ELECTRICITY	1,557.23

8065M.OFFICE SUPPLIES	469.29
8069M.BUILDING MAINTENANCE	326.92
8072M.ARTIFACT PURCHASE FUND	200.00
8073M.LIBRARY BOOKS	139.18
8074M.LOCAL CONTRIBUTIONS BY MUSEUM	45.00
8075M.ALARM SYSTEM	187.00
8090M.SPRING MEET EXPENSES	750.00
8115M.ADVERTISING AND PHOTOGRAPHY	949.00
8130M.VOLUNTEER APPRECIATION	1,407.98
8150M.MEMBERSHIPS	155.00
8152M.AUCTION COSTS-MUSEUM	-275.20
8155M.WATER	56.00
8160M.TELEPHONE	1,060.57
8165M.EBAY FEES	55.19
8166M.EBAY POSTAGE	15.33
8167M.OTB & REVIEW SALE SUPPLIES	95.93
8168M.OTB & REVIEW SALE POSTAGE	817.93
8191M.MISC. EXP.-MUSEUM	275.20
Total Expense	21,468.84
Net Ordinary Income	-12,927.15
OtherIncome/Expense	
Other Income	
9100.TRANSFER FROM CLUB	-469.50
Total Other Income	-469.50
Net Other Income	-469.50
Net Income	-13,396.85

AWA Electronic Communication Museum Balance Sheet

AS OF OCTOBER 31, 2000

Assets	Oct 31,'00
Current Assets	
Checking/Savings	
1080.MARINE MIDLAND CKING-MUSEUM	23,643.18
Total Checking/Savings	23,643.18
Accounts Receivable	
1300.ACCOUNTS RECEIVABLE	2,363.57
1390.INTERCOMPANY RECEIVABLE	6,000.00
Total Accounts Receivable	8,363.57
Other Current Assets	
Certificates of Deposit	58,840.28
1400.PREPAID EXPENSES	166.67
1600.INVENTORY	10,095.00
Total Other Current Assets	69,101.95
Total Current Assets	101,108.70
Fixed Assets	
2400.LEASEHOLD IMPROVEMENTS	5,386.38
2405.STORAGE BUILDING	88,549.02
2450.DEPR. RES ON STORAGE BUILDING	-33,912.78
2499.DEPR. ON ELECTRONIC COMM. MUSEU	-5,386.38
2500.LAND-LEGION PROPERTY	16,562.89
2510.COMPUTER EQUIPMENT	2,641.98
2545.DEPR. RES. ON COMPUTER EQUIPMEN	-1,056.38
Total Fixed Assets	72,784.73
Other Assets	
1199.DUE TO/DUE FROM	49,419.65
Total Other Assets	49,419.65
Total Assets	223,313.08
Liabilities & Equity	
Equity	
3000.Opening Bal Equity	174,342.98
3900.Retained Earnings	62,366.75
Net Income	-13,396.65
Total Equity	223,313.08
Total Liabilities & Equity	223,313.08

How to Contact AWA Officers and Directore

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Morgan Wesson
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Victor, NY 14564
mwesson1@rochester.rr.com

AWA NETS

PHONE:

SUNDAY:

7244 kHz, SSB, noon (NCS:WA4IAM);
3837 kHz, AM 4 p.m. (E.S.T.), 4:30 p.m. (during E.D.S.T.) (NCSs:W2ZM & W2AN)

TUESDAY:
14274 kHz, SSB, 2:30 p.m. (NCSs KC3YE and W0FXY)
3837 kHz SSB, 8 p.m. (NCS WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:
3867 kHz, SSB, 9:30 a.m. (NCS: W2OBJ)

CW:

DAILY, 4 p.m., 3588 or 7050 kHz.
Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up.

First **WEDNESDAY** of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 146.820 MHz
Transmit 146.220 MHz

Nominations for AWA Awards

It is time to nominate candidates for six prizes to be given at the annual conference.

The **AWA Houck Award for Documentation** goes to an AWA member who has written several original articles on radio development or history in *The OTB, Review*, or other publication. (This can include a book on a related subject.)

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired and preserved by documenting an outstanding collection of radio artifacts. Send your selection(s) to the Houck Awards Administrator, giving your reasons why the nominee(s) should receive the Award. The address: Barney Wooters, 8303 E. Mansfield Ave., Denver, CO 80237.

The Bruce Kelley-OTB Award is given to the member who publishes an article in *The OTB* judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in the August and November 2000 and February and May 2001 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and *The OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Bill Denk, W3IGU, 81 Steeplechase Rd., Devon, PA 19333.

The J. Albert Moore award is a newly-instituted companion to the Bruce Kelley-OTB Award. The award comes to us through The Antique Radio Club of America, which was merged into AWA a few years ago. It was originally given for the most outstanding article (any category) contributed to the ARCA Gazette during the publication year. Though the award continues a memorial to Mr. Moore's contributions to ARCA, it has been re-oriented as a companion to the Bruce Kelley-OTB Award—honoring articles that do not fall into the historical category considered for the latter. And so the Moore award will be given "... to the article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed in *The OTB* during the award year. Eligible articles include those dealing with troubleshooting, restoration, performance evaluation, identification methods, and history. " For this year, articles in the August and November 2000 and February and May 2001 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and *The OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Thomas F. Peterson, Jr., 3060 Lander Rd., Cleveland, OH 44124.

The **Taylor Award**, in memory of John Taylor, RCA TV Developer, is for "preserving television history." Submissions are invited here, too, to Peter Yanczer, 835 Bricken Pl., Warson Woods, MO 63122.

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations may be sent, with supporting reasons, to administrator Lauren Peckham, Box E, Breesport, NY 14816.

Please send nominations for all awards by August 1, 2001

Recurring Meetings

• **Antique Radio Collectors of Ohio**—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

• **California Historical Radio Society**—For info on current meetings, call the CHRS hotline: (415) 821-9800.

• **CARS**, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cinti.) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

• **Carolinas Chapter of the AWA**—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron

Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net.

• **Central Ohio Antique Radio Assn.**—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

• **Delaware Valley Historic Radio Club**—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Bill Overbeck at (610) 789-8199 or Dave Snellman at (215) 345-4248. Club mailing address: P.O. Box 847, Havertown, PA 19053.

• **Houston Vintage Radio Association**—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership $15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

• **Hudson Valley Antique Radio & Phono Society**—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

• **London Vintage Radio Club**—This Ontario, Canada club meets in London on the last Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada. (519) 638-2827.

• **Mid-Atlantic Radio Club**—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Ed Lyon, 11301 Woodland Way, Myersville, MD 21773-9133, (301) 293-1773, e-mail lyon@ fred.net or Membership Chair, Paul Farmer, (703) 960-0650, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

• **New Jersey Antique Radio Club**—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

• **Northwest Vintage Radio Society**—Meets second Saturday of each month (except July and August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

• **Oklahoma Vintage Radio Collectors**—Meets second Saturday each month, Hometown Buffet, 1012 S.W. 74th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or call (405) 755-4139 or (405) 732-6070; or e-mail fkarner@mmcable.com.

• **Ottawa Vintage Radio Club**—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: $10 Canadian/yr.

• **Pittsburgh Antique Radio Society** welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

• **Society for Preservation of Antique Radio Knowledge**—Meets at 7:30 p.m., fourth Tuesday of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $12/year. Write SPARK, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call Dan Gebhart (937) 299-9570.

• **Texas Antique Radio Club**—Meets alternate months in Kyle and Shertz, TZ. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Richard Ransley, P.O. Box 41, Sodus, NY 14551. The following are available:

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WW I military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and 1BCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE

Cost: $300

Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816. Phone (607) 739-5443, e-mail awapeckham@aol.com

AWA MEMBER E-MAIL CHECK-IN REQUEST

With more and more people getting on line daily, it's time for your AWA to explore the possibilities of using the internet for serious member communications. At this time, we'd simply like to gain some idea of what percentage of the membership is able to access our web site. If you have that capability, please take a moment and visit the site (http://www.antiquewireless.org). Then click on "Members Please Check In!" on the main menu and fill in the name and e-mail address blanks as directed. It's as simple as that!

If you have already checked in as a result of the notices we've placed in various radio chat rooms and other internet sites, it is not necessary to do so again.

Thanks,

Antique Wireless Association

With the Chapters

As I write this copy it's been 2 weeks since the "25th. Anniversary, Spring Meet in the Carolinas" took place in Charlotte, and I'm still trying to catch my breath (and it's not from smoking all those cigars).

This has to have been the best ever. All of the accounting isn't done yet, but it looks like there were well over 400 in total attendance, and there were 151 flea market spaces sold, an all time high. If this growth rate continues we may have to start counting how many spaces are *unsold*, since there are only 197 spaces available.

We had some really great programs on Thursday afternoon and evening this year. Starting out the afternoon, Nat Pendleton showed off his 1936 RCA television field test receiver; it works great and looks great too. Ed Lyon gave a very interesting talk on WW2 Electronic Countermeasures with lots of photos and some interesting pieces of equipment to look at. Dennis Osborne gave a great slide show on 1920's Home Brew and Kit sets. The last program, CC-AWA's Annual Membership meeting, is required by North Carolina state law as condition of our being incorporated.

Following the afternoon programs 22 of us caravaned to an Italian restaurant. This group grows in number every year and it was suggested that I put it on the conference event schedule for next year. I might just have to do that.

Thursday evening (after a GREAT dinner) the programs continued, with Brad Jones talking about the *Care and Feeding of Bakelite and Catalin Radios*. Lots of pretty colors and good information about repair and restoration. Then, in his traditional talk on restoration, Stan Watkins demonstrated the repair of a badly humming All American Five. With his soldering iron in hand and a transparency of the schematic on the overhead projector, Stan showed everyone which caps and resistors needed replacing and how to do an alignment when the repair was complete. All in the span of about an hour. Not Bad.

Friday morning began with the usual "Lemans Start" at the flea market. The accompanying photo, taken at about 9 a.m. shows the flea market in full swing. You'll notice that there aren't many empty parking spaces.

This year we solved the problem of difficult rest room access with the help of the Sheraton staff. A large Hospitality Suite (with restrooms), was located just inside the hotel doors closest to the flea market. The Sheraton also did great job again this year in providing very a inexpensive breakfast and lunch at a table set up right next to the flea market.

Our Friday afternoon equipment auction was not as large as in some of the past few years, but some really good stuff was sold. Brad Jones took over the job of auctioneer for us this year, with the help of Gerald Cromer, and they did a great job.

Since this is our 25th Anniversary we decided to add a banquet to the normal Friday evening reception and social. There were 55 of us for dinner with some great tunes provided by our good friend Andy Bickle from MIX 106.1 FM.

Following dinner, we opened up the doors so everyone could join in the socializing and look at all the contest entries. There were even a good number of couples seen on the dance floor after Andy finally played Patsy Cline's "Crazy". One of my all time favorites.

Saturday morning, the flea market started off as usual but a this year there was something else new, a "Radio Rescue" auction. Some other clubs have tried this so we thought we'd give it a shot. IT WORKS!!! 12 to 15 items showed up, including a blue-mirror Sparton Sleigh, a 1921 Adams Morgan receiver with a straight neck Magnavox horn, and a big early Kolster AC set with one of the biggest horn speakers I've ever seen— a fiber horn in a cabinet the size of a floor model radio. The Adams Morgan pair and the Sparton were for display only. But most everything else that was brought in went up for bid, and since we had just a few things to sell we let the guys in the flea market add a few radios.

Brad had to leave early on Saturday so yours truly got to try his hand a being an auc-

tioneer. It was fun, but I don't think I have ever been that dry! By the way with the help of my wife, who bid for me, I managed to bring the BIG cabinet horn home with me. Getting it into the back seat of her car and then into the house is another story.

While "Radio Rescue" was going on in the parking lot another group was judging the equipment contest. There were some fantastic entries this year, I just wish I had space to list the winners. As in previous years, we wound up "Spring Meet in the Carolinas" with a luncheon, and this year we were joined by the Piedmont Chapter of the QCWA.

I can't end this without thanking some folks without whom this event could not and would not happen. Robert Lozier, who handles the data base and all the money for our club and the meet. Erine Hite, who does a great job of handling the registration desk and just about anything else I ask him to do. Brad Jones, Gerald Cromer, John Stegal, Malcolm Skipper, R.L. Barnett, Tom Houghtaling and all the other guys that helped with moving the radios around for the Auction.

The next events on the CC-AWA calendar are the Swap Meets at Spencer Shops, the NC Transportation Museum, on May 12th and at the R.L. Harrill Center, NC State Fairgrounds, in Raleigh. As always you can find more details on CC-AWA events by visiting our home on the world wide web at CC-AWA.org. You are also invited to join the CC-AWA's email reflector by sending a blank message to, cc-awa-subscribe@yahoogroups. com—or you can still do it the old fashioned way: write to me at CC-AWA, P.O. Box 3015, Matthews, NC 28106-3015, or call 704-289-1166 after 6 p.m.

The flea market in full swing about 9 a.m. on Friday morning.

73

Ron Lawrence KC4YOY
CC-AWA President and Conference Chairman

LETTERS, *continued from page 6*

use them from now on in all my columns.—RP

ANNOUNCEMENTS

New Television Society

The Experimental Television Society (ETS), is a registered non-profit corporation that concerns itself with television in all its forms, be it mechanical or electrical in nature. We are interested in television history and what it took on the part of pioneers to make it work. For every success along the way, there were at least as many, if not more failures, but all of their work done together provided a firm base of knowledge that resulted in the systems that we enjoy in our homes today. Looking back on it, the steps taken by the pioneers are quite often very interesting, duplicating their work can be downright fascinating and that is what we, the members do.

ETS was formed in March of 2000 with 12 charter members. It presently has 24 members. Membership is open to anyone with more than a passing interest in television. Much of the communications between members is accomplished through e-mails, but we also have the *Electric Pictures Quarterly* bulletin, regularly sent to all members. ETS also will have an annual Conference, the first one to be held in the St. Louis area this August 11th. Dues are $20 per year in the USA and $24 elsewhere. Send your correspondence to James T. Hawes, acting Secretary, 8611 Kedvale, Skokie, IL 60076. Check out the following web site to get more information about ETS and television in general. http://pyanczer.home.mindspring.com/Tour.Please note the upper case "T" in Tour.

PETER YANCZER
via e-mail

Community College Antique Radio Course

The Vintage Radio and Communications Museum of Connecticut is running a short course in antique radio theory and repair in collaboration with Manchester (CT) Community College. The course consists of five 2-hour Saturday sessions to be run between May 19 and June 23. Fee is $75.00. For more information, call Mike Hiza, Faculty Coordinator, at (860) 647-6132.

THE *AWA REVIEW* VOLUME 13 IS NOW AVAILABLE

The Antique Wireless Association presents for your reading interest a new volume of *The AWA Review*, with some unusual content.

The lead article is by well-known Canadian member Robert Murray, who explores in depth the Canadian Northern Electric manufacturing company and its radio products. The detailed

listings and numerous photos should prove to be of considerable interest to the radio collectors and historians, especially to those who may not have known much about the products of this rarely-mentioned company.

Graeme Bartram of Australia, a relative newcomer to our pages, recounts a little-known legal case that led to the commercial dominance of the Marconi Company in the field of wireless telegraphic communications for many years. He also introduces us to another radio pioneer, John Graeme Balsillie. A key element within the story is the famous Marconi 7777 patent.

Next, Bart Lee, a well-known historian and writer, continues with the Marconi theme by exploring in depth the controversial "three dots" first message from England to Newfoundland on December 12, 1901. While writers over the years have cast doubts on the veracity of the Marconi claim, this paper draws on some little known sources to place this historic event in better perspective, and in the process, provide us with some very interesting reading.

Richard Foster of Cochituate, Mass., and Pierre Demerseman of Paris, France, have joined forces to produce a discussion of radio direction finding, and "Huff-Duff." This World War II secret weapon played a vital role in the Battle of the Atlantic, and was instrumental in reversing the very serious situation in favor of the Allies. Coupled with a history of radio direction finding, the authors explore the significant work of French engineer Henri Busignies, including details of his related patents.

Writer Pamela Grundy, of Charlotte, NC, who is well known to the members of the AWA Carolinas Chapter for her interest in early radio, has offered for our reading pleasure the early history of Charlotte's radio station WBT. The challenges facing the early radio station pioneers as the industry developed are reflected in this lively tale.

Following through on early radio stations, George Freeman, well known within AWA circles, tries his hand at authorship by exploring the theme of just how these pioneer stations came into being in the fledgling industry, and how some survived while many did not. Appended is a comprehensive list of these early stations, which, the author assures us, is still developing.

The AWA Review Volume 13 is available now for US$19.95, postage paid in U.S. and Canada, by writing to: AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468. Overseas orders add $5.00. Make checks payable to AWA Museum. 155 pages, 107 illustrations, soft cover.

AWA Annual Conference

THRUWAY MARRIOTT, ROCHESTER, NY
SEPTEMBER 5-8, 2001
THEME: STROMBERG-CARLSON

WELCOME BACK! At the 40th annual conference collectors and history enthusiasts will convene, exchange equipment, and learn more about the development of radio and electronics. If you have never been to the yearly "reunion," why not give it a try? Rochester (Henrietta) is just north of upstate New York's beautiful Finger Lakes region, easily reached by car or plane. The site is 26 easy miles from the AWA Museum at Bloomfield.

Advance registration is encouraged to facilitate preassembly of registration materials and pre-assignment of flea market spaces. Your materials for advance registration will be included in the August *OTB*. There will be unlimited registration at the door.

The conference site is The Thruway Marriott, which is a full-sized, full-service hotel. It offers special nightly rates ($92 single, $94 double) up to Aug. 27. For info or reservations, call (716) 359-1800. the Marriott has high-quality restaurant facilities, and other lodging and eating places are nearby.

The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles or 15 minutes from the airport. There is shuttle service, 7 a.m.-11 p.m. (specify the Thruway Marriott).

The special theme for this year is "Stromberg-Carlson."

Conference Chairperson
BRUCE ROLOSON

Assistant Chairperson
HUGH DAVEY

Program Chairperson
LAUREN PECKHAM

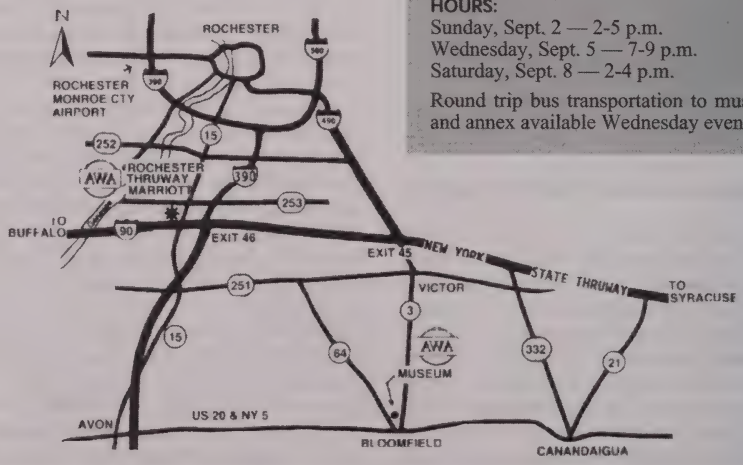
Contest Chairperson
GEOFFREY BOURNE

AWA ELECTRONIC COMMUNICATIONS MUSEUM
VILLAGE GREEN, BLOOMFIELD, NY

Refer to map at left. Directions from hotel: Right (south) on Rt. 15. At Avon (9.5 mi.), left (east) on RTS. 5 & 20. At Bloomfield (16 mi.), left at brown "Radio Museum" sign near Holloway House restaurant. Go approx. 200 ft. and park. Museum is on the left.

HOURS:
Sunday, Sept. 2 — 2-5 p.m.
Wednesday, Sept. 5 — 7-9 p.m.
Saturday, Sept. 8 — 2-4 p.m.

Round trip bus transportation to museum and annex available Wednesday evening.



THEME: STROMBERG-CARLSON

Programs

ANNUAL HISTORICAL BANQUET AND AWARDS
Program to be announced

NEWS FOR THE SHORTWAVE LISTENER
Presenter: Bart Lee

KEY AND TELEGRAPH SEMINAR
Moderated by Tom Perera

VACUUM TUBES: HISTORY AND DISCUSSION
Presenter: Tube Collector's Association

MOONLIGHT RESTORATION FORUM
Concurrent with Wednesday evening museum and annex tour.
Hosted by Marc Ellis

HISTORY OF THE STROMBERG-CARLSON COMPANY
Presenter: Lud Sibley

VINTAGE AM/CW OPERATION
Jim Millen's station equipment will be used in celebration of the 100th anniversary of his birth.
Host: Don Buska, N9OO, president of the James Millen Society.

PRE-1912 WIRELESS AND ELECTRICAL APPARATUS DISPLAY AND DISCUSSION
Moderated by Lauren Peckham

REVIEW OF AMATEUR OPERATION
Discussion Leaders: Mike Raide, W2ZE and Bob Raide, W2ZM

Many activities are in store for you, including the huge flea market, open Wednesday through Saturday, three separate auctions, the annual sightseeing excursion, ladies' luncheon, bus trip to the AWA museum and Museum Annex, the old equipment contest, the indoor bookseller's fair, and the AWA Members' Forum hosted by President Bill Fizette.

COMPLETE CONFERENCE SCHEDULE AND REGISTRATION MATERIAL
TO BE INCLUDED IN AUGUST ISSUE OF *THE OTB*

SEE NEXT PAGE FOR OLD EQUIPMENT CONTEST CATEGORIES

BY GEOFFREY BOURNE AND RALPH WILLIAMS
CONTEST COORDINATORS

THE OLD EQUIPMENT CONTEST
2001 AWA CONFERENCE
— *Reviewing Stromberg-Carlson* —

The AWA Old Equipment Categories for the 2001 contest are divided into two major groups; Theme and Standard. The Theme categories reflect the Conference's central historical purpose: a review of the products and history of the Stromberg-Carlson Co.

This year we will be changing the Standard categories; Receiver, Transmitter and Craftsman. The receiver categories will be delineated by the type of circuit in the entered receiver. Every year we have had two Transmitter categories; Spark and CW. This year we are changing them. Over the past several years we have not had the as many entries as we would like. So as of this year these categories will be included in a new "Amateur Radio" category, containing both spark and vacuum tube sets. The Craftsman categories, as always, fulfill a strong membership interest by offering opportunities to showcase skills in conservation and restoration

THE THEME CATEGORIES

1. The 1920s Battery Sets

When radio was just in it infancy every one wanted to be a part of it. Stromberg- Carlson was no exception. They made some interesting sets in the '20s. Bring one to display.

2. The 1920s-1930s Consoles

In this category you can display a wide variety of radios. Stromberg-Carlson made some very interesting sets. From the very art deco to heavily ornate to just plain heavy. Bring one in to show it off.

3. Cathedrals and Tombstones— the 1930s

In the 1930s the country was in the middle of the great depression. Money was tight and radio was becoming very popular. To maintain its share of the market, Stromberg-Carlson brought out a line of low cost receivers. This would be the category to display a nice cathedral or tombstone.

4. The 1940s Sets

This is where you would enter a 1940s pre- or post-war set. Stromberg-Carlson made some very interesting sets in this time period. It is very educational to compare the technology differences between pre-war and post-war examples.

5. Speakers

Over the years Stromberg-Carlson produced many speakers, including floor model cone speakers and horn speakers. Bring one in to show it off.

6. Television 1940-1960

When television came on the market just about every manufacturer made a set. Stromberg Carlson offered a wide variety, from table top sets to floor models. Bring in a fine example to share with everyone.

7. Company History

In this category we are looking for company information, sales quotes, engineering documents, technical information bulletins or other documents to add life to the company.

8. Advertising and Customer Documents

In this category we are looking for customer-oriented documentary artifacts. Magazine ads, dealer displays, give-aways, descriptions of radio or television programs, or customer instruction books are examples of the entries in this category.

9. Other Stromberg-Carlson Products

Stromberg Carlson, like other corporations of its type, made a variety of products. For instance, they were a large producer of telephone and audio equipment. Bring in something that we have not seen. Surprise us!

THE STANDARD RECEIVER CATEGORIES

10. Passive Receivers

Any detecting device that does not include vacuum tubes or solid state amplifying components whose purpose is to convert radio energy into intelligent signals.

11. 1920s Superhet Receivers.

Any receiver which employees the superhetrodyne circuit and is from the 1920s can be entered here.

12. 1920s Tuned RF Receivers

During the '20s the TRF set was one of the most widely marketed. It was sold in kit form, factory assembled or built from scratch from a plan in a magazine. This is where you would enter a Freshman Masterpiece or an AK 20 and so on.

13. 1920s Regenerative and Reflexed Receivers

Many manufacturers employed different circuits to improve the receiving capabilities of their radios. The regen and reflex are among the many circuits that were used. Bring in a fine example of this type of radio.

14. Cathedrals and Tombstones

These are probably the most recognized antique radio styles. Just about everyone remembers someone in their family who owned one. So bring in that Philco 90 or Zenette or any other cathedral or tombstone style radio.

15. Radios in Disguise

Entries here can range from an end table radio to a lamp radio. There are many different styles and variations. Some fine examples would be a Porto Bar Radio, Melody Cruiser ship radio, or any radio made to look like something else.

16. Speakers

A. HORN: Any sound reproduction device can be entered here as long as it employs a horn or bell for sound amplification.

B. CONE: When radio sets obtained greater power output levels the magnetic speaker unit was designed with large surface areas for better sound reproduction. There are many fine examples of this type of speaker. i.e. Tower Adventurer, Western Electric…

17. Test Equipment

This is second year for this category in the contest. Many people have asked for it to be included. There were many makers of test gear. A short list would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, RCA, And too many others to list. So surprise us, bring in the unusual or the common.

18. Tubes

In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological breakthrough, etc. The display should tell a story.

THE AMATEUR RADIO CATEGORIES

19. Spark Transmitters and Artifacts

Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

20. Vacuum Tube Transmitters and Receiver

Some of the sets for this class are old, some not so old, most home-built. While the predominant entries have been amateur-operated, commercial equipment is welcome.

THE CRAFTSMAN CATEGORIES

21. Restoration of Appearance

The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details.

22. Restoration of Operation

This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transis-

torized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates such a restoration. An entry should be accompanied by documentation showing the basis of the update that preserves the quality of the original.

23. New or Rebuilt

Previously we have encouraged entries that showed the conference attenders how substitutions and reconstructions could provide vital parts or pieces. We also encouraged craftsmen who had made an old function come alive again to bring their work for review. Do you remember the Federal receiver that was entered several years ago and the operating Marconi coherer detector from the year before last? We want to continue that tradition so bring in your retrospective designs and your reconstructions. There is no requirement for particular devices or circuits.

THE CONTEST AWARDS

In addition to the prizes ranking winners in each contest category, there are five special prizes to be awarded to outstanding entries as follows:

Elle Craftsman, Given in memory of Bruce Elle to the builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter, Given for excellence in constructing or restoring transmitting equipment.

Display, Recognizes the entry considered to have the best informational value and quality.

Thompson Best of Show, Awarded in honor of early amateur Eunice Thompson, W1MPP, to entry considered to be the overall best.

People's Choice, Awarded to the entry that receives the most favorable votes from attendees and visitors to the contest. All entries including displays are eligible for this award.

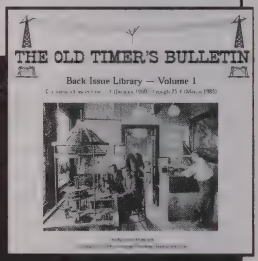
The OTB Is Now Available On Two Compact Discs!

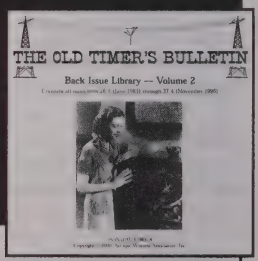
- ***All*** **back issues of *The OTB* from the beginning through 1996 are included.**
- **Any issue is instantly accessible.**
- **Print, graphics and photos are clearly readable on screen.**
- **300-dpi scans allow a crisp, full-size printout of any page (on inkjet, laser, or other high-resolution printer).**

CD VOLUME 1 CONTAINS:
Issues 1-1 (January, 1960) through 25-4 (March, 1985). Price: $49.95 U.S./Postpaid in U.S. and Canada

CD VOLUME 2 CONTAINS:
Issues 26-1 (June, 1985) through 37-4 (November, 1996). Price $49.95 U.S./ Postpaid in U.S. and Canada.

BOTH DISCS:
$89.95 U.S./Postpaid in U.S. and Canada.



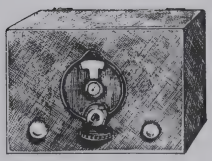


COMPUTER SYSTEM REQUIREMENTS
Any PC or Mac system capable of running Acrobat Reader 4.0
Specific PC Requirements:
- 486 or better processor
- Microsoft Windows 95 or 98, or Windows NT 4.0 with service pack 3 or later recommended)
- 10MB of available hard disc space

ORDERING INFORMATION
Send your order to: CD Offer, AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468. Be sure to include your check or money order for the proper amount, making checks payable to AWA Museum. Single disc orders: be sure to clearly indicate volume desired. Add $5.00 per order for postpaid shipment outside U.S. and Canada.

AMATEUR RADIO

EDITED BY **JOHN F. ROLLINS, W1FPZ**, HC 33, BOX 150, ARROWSIC, MAINE 04530
PLEASE INCLUDE SASE FOR REPLY.



Results of the 2001 Linc Cundall Memorial OT CW Contest

Another Linc Cundall Memorial OT CW Contest ended at 2300 hours Zulu on January 28, 2001. I must immediately apologize for my choice of the 80 meter band segment (3580-3600 kHz). Wednesday-Thursday, Jan. 24-25th appeared to be reasonably clear of RTTY but Saturday-Sunday, Jan. 27-28th was a disaster, with a full-blown RTTY contest in full swing. Sorry guys, I'll try to do better next year! Ihe band segment 3550 to 3580 kHz remained clear both evenings, except for the occasional QSO.

Next year we shall plan on 3550 to 3580 kHz, so those of you operating crystal control can start looking for a few rocks covering this segment. I hope this will not cause too much of an inconvenience.

In spite of the RTTY problem on 80 meters, the overall scores were generally higher than last year. We also had fewer participants—56 versus 60.

Once again Bob Raide was the clear winner with an outstanding score of 1152 points. He had strong showings on all the bands. Another of the Raide boys, Mike W2ZE, had a strong 2nd place with 711 points. It must run in the family!

Propagation conditions seemed to be quite favorable across the country. This, I think, is reflected in the higher number of contacts. I was also pleased to see three contestants in the W0 district. In some years we don't see a W0.

The very neat station at W3VVS. Paul is shown contesting with his 1939 Meissner Signal Shifter and 1938 RME 69.

In the DX department, Jun, JH8SST/7 perseveres each year at low power and someone on the west coast always hears him and is able to answer. Thank you for your efforts Jun.

The number of QSOs per band is as follows:

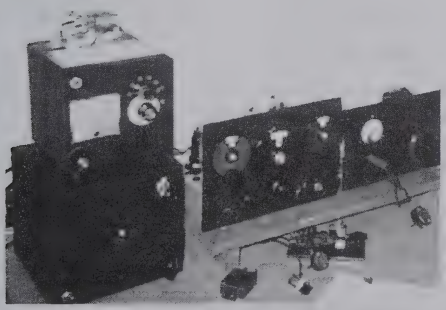
Band	160	80	40	20
Total QSOs	17	804	366	181

So that about does it for this year. Thanks to all for your participation. Hope to see you on Randy Haus' DX test. Two changes to be made for next year's contest:

(1) The 80 meter band segment will be 3550-3580 kHz.

(2) We shall move the equipment cut off date to cover old time equipment up to 1946. This will allow all surplus World War II military equipment to be used in the Linc Cundall Memorial Contest. We shall mention these two changes again later in the year as a reminder.

73 JFR, W1FPZ



Completely home-brewed station at W0VLZ includes wave meter, 3-tube superhet, power supply, RF amplifier, speaker, 6L6 oscillator (8 watts).

TOP TEN CONTESTANTS

CALL	POINTS	CALL	POINTS
W2ZM	1152	W6DJX	513
W2ZE	711	AA9DH	477
AC5AM	626	KB2PLW	367
K3DZ	624	WlYG	348
KJ8L	564	K2LP	287

COMPLETE CONTEST RESULTS

CALL	TX		QSOs/Band 160	80	40	20	Total Points
W-1							
KA1CFQ	'28	MOPA 202-211	17	8		150	
WlGIG	'38	MEISSNER/MOD	12		87		
WlDDW	'42	MOPA 801-810	15	5	115		
NE1S	'34	PP TNT/TRI-TET	16	9	16		259
K1F1	MOD		13	2			80
WlYG	'38	MEISSNER	1	27			348
WlFPZ	'34	47-210-203A	22	14			144
WlYT	'40	XTAL 6L6	1	13	10		144
W-2							
KB2E	MOD			22		5	60
W2ZE	'40	6V6 ECO-6L6s AMP					
	'29	HARTLEY	1	42	18		711
N2TWW	'27	TPTG 210		4			36
W2YIK	'29	HARTLEY/MOD-20		8	5	4	124
K2LP	'39	860F/MOD 20-40		41	19	2	287
KB2PLW	'40	6L6/MOD		27	19	6	367
KE2O	'29	OlA/MOD-40		15	12		144
W2LYH	'36	ECO-6V6-6V6-6L6 2	10	11	2		118
W2RS	'41	MEISSNER		16	19	3	234
N2VO	MOD		15				45
W2LID	MOD			23	14		96
K2KK	'37	XTAL 6F6-6L6		9			54
K2MP	'38	XTAL 6V6-807		9			81
W2ZM	'29	HARTLEY	4	49	29	19	1152

CALL	TX		QSOs/Band 160	80	40	20	Total Points
W-3							
W3WS	'39	MEISSNER		11	17		252
W5WS/3	'38	6L6F/MOD		20	23	8	190
K3DZ	'38	6K6 XTAL		32	13	5	624
KB3SI	MOD	2	7	7	3		38
WB3HLH	'41	PP 6V6 XTAL		9	8		153
KD3OR	'38	XTAL 6L6		11	3	4	65
W3HWT	'24	202 HARTLEY	1	6			63
W-4							
K4LJH	'29	211 HARTLEY		15			102
AA4RM	'41	COLLINS		15	7	9	179
W4LN	'47	XTAL OSC+10 AMP		21	11		216
W4VBX	'38	ECO-6L6/MOD		5	6	2	96
W-5							
K5RB	'29	HART MOPA/MOD	2	10	8	4	187
K5CF	'40	THORDARSON 90W		10			84
AC5AM	'41	COLPITTS 6V6-PR					
	807s,'38	807 HART	1	22	10	15	626
W-6							
W6ZZ	MOD			1	1		6
W6TDP	'37	UTAH UAT-1		3	3	8	111
W6DJX	'29	TNT, '40					
		6SK7-6V6-807		16	8	14	513
W-7							
K7SKP	MOD			1		3	20
W7LOG	'37	XTAL 6V6-807		2		5	72
W7LNG	'33	PP 45 HARTLEY					
		203A HARTLEY		11		7	140
W-8							
W8ZNX	'35	6A6 PP OSC		8			90
K8JWR	'29	MOPA 27-27		17			162
W8KGI	'41	MEISSNER,					
	'42	BC459			6	5	90
WD8OFB	'29	HARTLEY		1			6
KJ8L	'39	NAVY TCS	2	34	11	14	564

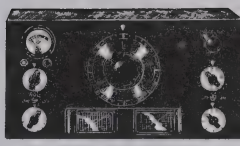
CALL	TX		QSOs/Band 160	80	40	20	Total Points
W-9							
W9QZ	'29	27 HARTLEY, MOD		21		8	216
AA9DH	'35	10 TNT		18	11	10	477
N9TT	'40	BC-375, MOD		20	3	9	104
W-0							
W0NVM	'39	STANCOR		12			138
W0VLZ	'40	6L6 OSC		7	2		126
KB0ROB	'29	HARTLEY		3	1		42
VE							
VE3HN	MOD			10			40
VE3BHW	MOD				3	12	
DX							
JH8SST/7	'38	XTAL 6F6-6F6-807, MOD			1		3

BRUCE KELLEY MEMORIAL 1929 QSO PARTY
LATE LOGS

Here are some late turn ins for the December '29 QSO Party. Sure wish I could get everyone to turn in their logs promptly. It would make it much easier for me. Time is particularly tight for me in the December event. I have to compile everything in late December and get it in the mail to reach our editor by December 31st deadline. Thanks.

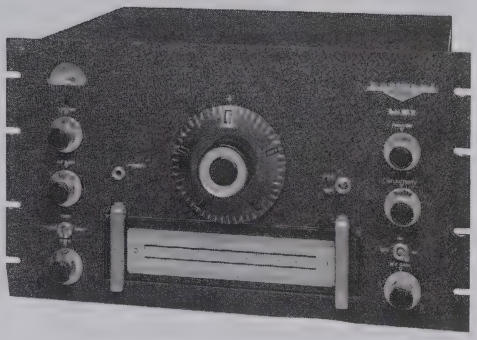
Station	Contacts	TX	Power	RX
WA3FFC	65	128 MOPA, 10-10	10W	-
W4VBX	10	TNT 10	9W	HRO
W2AO	36	HARTLEY 10	8W	-
KC8DDH	2	TNT 10	10W	-
W0OG	24	TNT 10	10W	-
WAIKPO	12	HARTLEY	2W	-
W1NV	5	HARTLEY 45	-	3 TUBE REGEN
W8KGI	4	HARTLEY 10	10W	'33 SW3
VE3BHW	16	HARTLEY 45	4W	-

THE COMMUNICATIONS RECEIVER



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

The National Company HRO-7



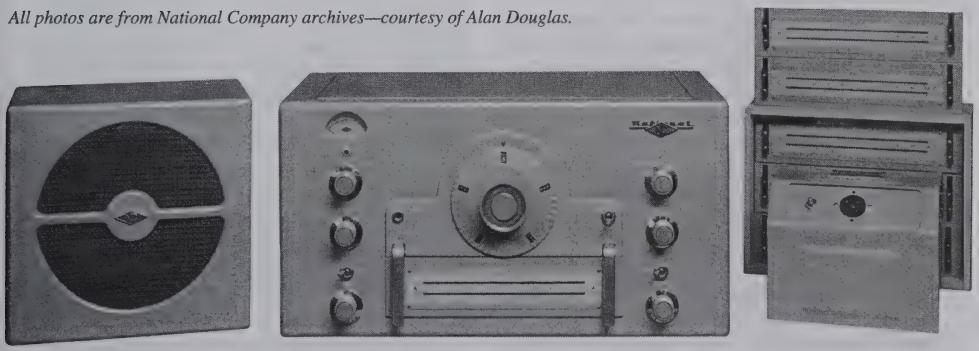
The rack-mount version, designated HRO-7R.

The National Company HRO series receivers undoubtedly enjoyed the longest production run in the history of communications receivers—from its introduction in 1934 to the end of the tube models, the HRO-60, in 1964. When the receiver was introduced it incorporated new technology, and at the time World War II broke out in September, 1939 it was the finest on the market. Furthermore, it was easy to use. The relatively untrained operators who were given the job of monitoring frequencies on a continuous basis, for example, only had to be concerned with the one tuning dial. Consequently sales boomed during the war years, and with a product that represented excellence, only superficial changes were made over the years.

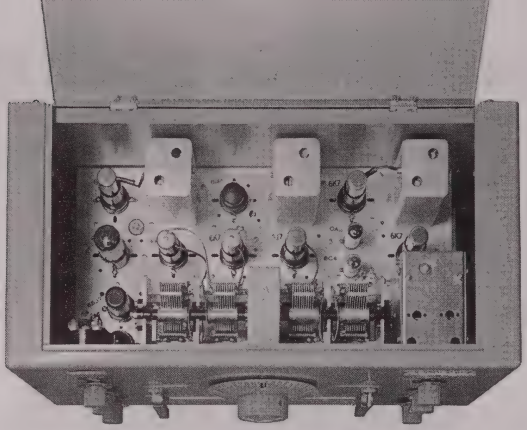
In addition to the basic receiver in both table and rack-mount versions, a group of accessory products were also available, such as speakers, extended range coil sets, coil sets without bandspread, auxiliary power units, and the SPC rack unit that incorporated the power supply, the speaker, and a coil storage compartment.

With the end of the war, thousands of wartime HROs became surplus and were released to civilian markets. National was left with the task of creating a new product, and to fill the gap they introduced (1946) the HRO-5A and then the -5A1. These were essentially pre-war HRO designs with the

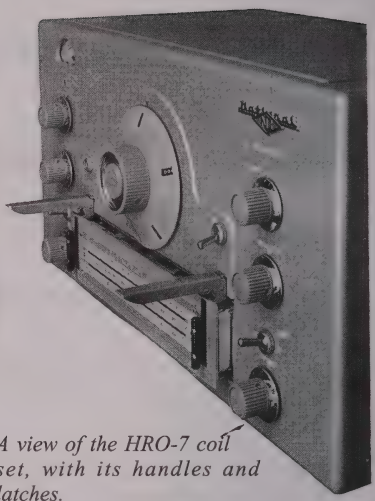
All photos are from National Company archives—courtesy of Alan Douglas.



The 1947 National Company HRO-7T with matching speaker, power supply, and six coils.



Top inside view of the HRO-7. Note the strong physical resemblance to the earlier models.



A view of the HRO-7 coil set, with its handles and latches.

addition of a noise limiter and metal tubes. In effect, while -5A was a good receiver, it was an obsolete design, using mid-1930s metal tubes, and with no major technical changes. And at about the same time, out in Cedar Rapids, Iowa, Collins was bringing out the first of the remarkably successful 75-A receivers, with a host of new ideas.

With some reluctance to abandon the HRO concept, National prevailed upon the design team to upgrade the receiver, and in August, 1947 the HRO-7 was announced in *QST*. The new features included a cosmetic redesign (new paint scheme, new cabinet styling, new knobs), a voltage-regulated oscillator, a new automatic noise limiter with variable threshold, and provisions for accessories as a NBFM discriminator and a crystal calibrator, a phono input, a 6-position switch for the crystal filter, a much easier to read calibration chart on each coil set, and lever-action handles to facilitate coil changing.

The matching speaker followed the 1930s design concept of having the output transformer mounted in the speaker cabinet, but in this case wired into the circuit so that if the speaker was unplugged, the B+ was removed from the plate and the screen of the 6V6 output tube, thus protecting it from burning up. By unplugging the tube to save power, and using headphones in the first-stage audio circuit, the receiver could be run on emergency battery power, such as the 686S vibrator power pack with a 6-volt DC source.

In the face of competition, and with National already promoting other receivers such as the NC-173, the NC-240D, and versions of the NC-183, followed later by the newer HRO-50 and -60 designs, the HRO-7 did not stay on the market long. Consequently it is considered a rather unusual HRO. Because of its distinctive appearance, and if coupled with the matching power pack, speaker, and coils, it is an interesting and sought-after collectible.

Many of the RF and IF tubes were still the of the double-ended design (grid cap on top) such as the 6K7 and 6J7. Sensitivity was listed as 1 microvolt or less throughout its frequency range. The one concession to progress was the use of a 6C4 oscillator/0A2 voltage regulator combination to help stabilize the high-frequency oscillator.

One design weakness; often the fiber rods used as coil handles have had the ends broken off from rough handling. Also, I noted one receiver that had a marginal paint job, with corrosion along the edges. The radio-phono switch, an interesting feature, is located on the back.

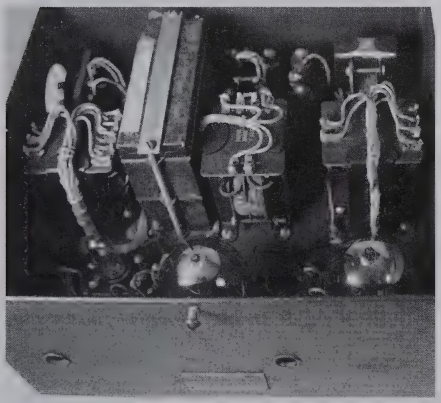
The rack panel version, the HRO-7R, is shown in the 1949 *ARRL Handbook* as the HRO-7C when paired with the SPC type assembly. It is an imposing sight, and enough to arouse the interest of any true boat anchor enthusiast.

If you wish to look up details, and don't have the manual, the Sams Photofact reference is Set #50-Folder #12, and Riders lists the information as being in Volumes 17 and 22. The Sams reference includes a good description of the servicing (removing, replacing, adjusting) of the main PW tuning dial. Finally, I wish to give credit to two sources; first to Alan Douglas, who allowed the use of his photos from the National Company archives, and second, to member Mike Tannenbaum, for his excellent survey article on HROs in the August, 1991 *OTB*.

BY RICHARD A. PARKS

FIRING UP A WESTERN ELECTRIC 34-A

This classic WE boat anchor weighs 37 pounds in its case.



With the cover off, we get a good look at the tubes, capacitors and audio transformers of the amplifier deck.

Back in the August, 1998 *OTB* I described the Western Electric 25-B—a general-purpose audio power amplifier that looks more like a space heater than a highly collectible early radio item. The two type 205D tubes used in that amp will cost you about $900 today if you can find any. When I get one in for checkout, I have to use a modified '80 rectifier in one socket and a similarly modified '01A in the other, because somehow I've never found enough 205Ds just to keep around the shop. To refresh your memory, W-E used one of the 5-watt triodes as a rectifier, with its grid and plate tied together, while the second tube runs as a straight transformer-coupled amplifier.

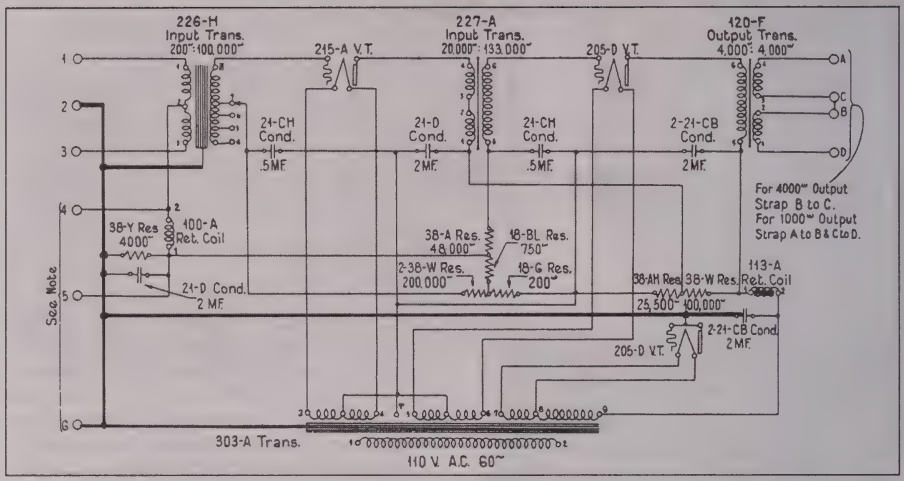
My best customer just brought in what looks like the next in the series of Western Electric commercial amplifiers. The nameplate reads: "34-A AMPLIFIER" and goes on to tell us that the unit runs on 110 volts AC, 60 cycles (Hertz to you new guys), using 60 watts from the power line.

When this thing was built, it was before the days of eight-ohm speakers; folks were using high-impedance speakers built like large earphones, wound with lots of fine wire and made to connect directly into the plate circuit of an amplifier tube. The familiar Radiola 100A is an example of such a speaker.

The label inside the top hinged cover tells us the amp was "sold and licensed for use only in connection with a loud speaking telephone" yet the schematic offers a note telling how to connect a "Phono Reproducer," probably an early magnetic pickup like those used in early phonographs.

Looking at the schematic, we can see that the designers added a 215-A peanut tube triode voltage amplifier stage to the basic 25-B circuit. They kept the weird-looking half-wave rectifier scheme using the diode-connected triode, and there's a complex voltage divider network using seven wirewound resistors (all of them still good) to develop the desired bias and plate volt-

2620 LAKE RIDGE CT., OAKTON, VA 22124



Original Western Electric schematic for the 34A.

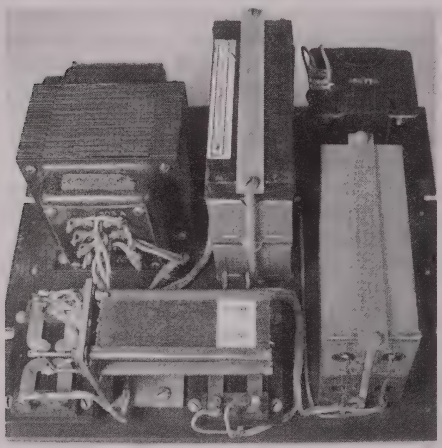
ages for the amplifier tubes.

All six capacitors are boxy paper-dielectric types made by W-E. I took some pictures of the insides of this box and they show the heavy construction used throughout. The tennis ball tubes are the 205Ds—collect them if you can! This unit weighs 37 pounds in its case, a real boat-anchor.

I was asked to make sure all the transformers and the choke had good continuity. All of these early W-E boxes I've looked at have been A-OK in that respect - quite a tribute to that grand old company. Well, there *was* the first one I got, with the fried power transformer primary, but that might well have happened when the owner plugged into 110 volts DC by mistake! After making resistance checks, I crossed my fingers and brought this unit slowly to life using my bench Variac.

At full line voltage, I got just over a watt out of the amp at 400 Hertz into a 1000 ohm resistive load. You get only a little more power if you let the waveform distort. Since the output tube runs at about 5.75 watts plate dissipation, the efficiency is down around 15 or 20 percent. Just for the record, I measured these DC voltage readings to chassis ground:

(continued on page 33)



View of underside of amplifier deck reveals massive power transformer, filter choke and caps, sockets for 205-Ds.

Decorative plates on wall-mounted speaker cover holes for optional controls.

BY JOE STEPHANY, N2XS

PUTTING THE NAVY OS-8 TO WORK

The U.S. Navy OS-8 series of oscilloscopes was manufactured from the 1950s to the early 1960s; it is the military version of the civilian "Pocket Scope." It features a 3-inch CRT with tube circuitry that was very compact for its time. It does not have calibrated gain, nor is the sweep circuitry very sophisticated. But it works well and has been found to be very useful in applications where continuous monitoring of signals is needed, such as checking the modulation envelope of a transmitter or monitoring received signals. It's also useful for some trouble shooting. My main use for it is in physics experiments monitoring electrical fluctuations in semiconductors. It is compact and fits well permanently on the ham shack table or electronics bench where more sophisticated 'scopes are excessively tall or wide and always too long.

There are many viewpoints in collecting antique equipment and I subscribe to more then one. Some equipment is worth having because of its historical importance and that spends most of its time on the shelf and gets a few ohs and ahs and a dusting once in a while. But my greatest enjoyment comes from actually using antique equipment in my everyday exploration of radio, electronics, and physics. And this is where the OS-8 fits, in use as well as in space, on my bench. I take the attitude that if you really have to have both history and usefulness, buy two, keep one for history, and modify the hell out of the other one. I bought my OS-8 many years ago. Today, several are often available on Ebay at any time (www.ebay.com, usually under "Navy Oscilloscope"). Fair Radio (www.fairradio.com) also has them in stock at various times. The main thing to be aware of in purchasing one is to make sure that there are no serious phosphor burns on the CRT.

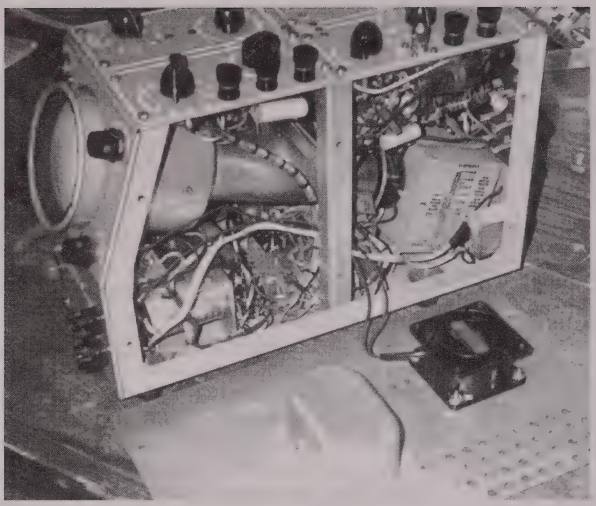
At the time that these scopes were made there was no protection from this problem as on modern scopes. The burns are easily seen as discontinuities in the normally white phosphor. A little irregularity in the phosphor caused by usage is OK (after all it is used equipment), but the phosphor should not be burned to the extent that small areas are either brown or missing. These can be seen without operating the scope, but if you are able to test the unit before purchase, defocus the beam and raise the intensity to flood the phosphor.

A replacement for the CRT, which is a 3RP1, is hard to find so make sure yours is good before buying. New 3RP1's can be ordered from Richardson Electronics, (www.rel.com), but are not cheap. At times, some can be found selling on Ebay at times. Phosphor burns come about through carelessness and are easily avoided by not operating the 'scope at high intensity and with no sweep for lengthy periods of time. Over the years my 'scope has had considerable operation and has not developed any such burns. After lengthy use, I found that some of the 12AT7's would fail by becoming gassy, although the emission and transconductance checked OK. I believe that this was due to excessive envelope temperature. Also, the phenolic boards on which the tube sockets were mounted showed some darkening, which is a sign of charring.

Probably the original specs did not allow for extended operation, since the chief function of the scope was for trouble shooting. The major sign of tube gas is that the trace will not hold its centering when rotating the gain control in the d.c. input position of either the H or V selector switch. In fact, it might be impossible to center the trace at all. Another sign is that the internal 5-Meg screwdriver adjustment pots for d.c. input compensation cannot be set and/or that he warm up time of the 'scope becomes excessive.

Although I do not like to modify antique equipment unnecessarily, I decided to make some much-needed changes. I installed a 120V computer fan by first cutting a round hole 2⅛" in diameter on the removable panel on the right back side just under the tubes. I used a metal coping saw and then trimmed the opening with a file. The fan is positioned so that there is enough clearance on the inside.

3369 LAKE RD., WILLIAMSON, NY 14589-9238



The OS-8 with its side removed to show location of computer cooling fan.

The fan I used is a TRW A24-B12A-15W3-3-000 (Allied 965-0100) with an Allied 609-5590 finger guard. Order from www.allied.avnet,com on the web. Caution: before doing this modification, operate your fan in its intended position to make sure that its magnetic field will not affect the CRT. Most computer fans will not, but it should be checked. The OS-8 does have some kind of magnetic shield around the CRT but is somewhat subject to external magnetic fields.

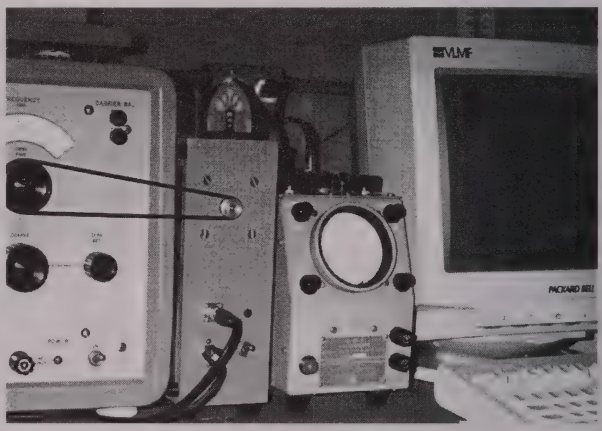
After this modification the 'scope ran much cooler and the case no longer made a good hand warmer (somewhat to my regret). Now it's just a little warm. If your fan is too noisy, which mine was not, speed may be reduced by trying different values of wire-wound resistors in series with the motor.

The line cord for the OS-8 was a problem. It was armored with a metallic mesh and had a strange retractable ground prong on the wall plug, with a metal shell. I considered this arrangement a hazard since the insulation inside had hardened and, if it cracked, the wires might short against the armor. I also did not like the idea of being in contact with the metal of the cord and plug when I plugged it into the wall socket.

I removed this cord and mounted a conventional filter-type line cord socket for a 3 wire line cord (Cor-Com 3EF1 or Allied 657-01-005) on the back of the instrument. If you want a socket without the EMI filter use Allied 689-3495. Also, finding that the pilot light was annoyingly bright,I placed a 22 ohm 1W resistor in series with it.

The vertical plates of the scope are driven by two 6AH6s, which may not be balanced. This is easy to check with the front panel controls. With no signal input and the vertical amp in the X100 position, lock the trace to 60Hz. Then move the trace up and down with the vertical positioning control. There will be a very slight vertical deflection, just barely noticeable, caused by 120 Hz hum in the power supply. At the center of the screen this slight defection should vanish and an exactly straight trace should be seen. If it is not the case, either the 6AH6s or the 12AT7 vertical amplifier tubes are not balanced.

There is no way of adjusting for this in the circuity, so the tubes may have to be replaced. But first check R116, R117, R123, and R124 to make sure they have not changed value (they should all be 3.6k). All tubes except the CRT can be ordered on the internet from either Fair Radio or Antique Electronic Supply (www.tubesand



My setup for measuring electrical fluctuation in semiconductors. From left to right: HP 302A wave analyzer, step motor unit, the OS-8, and the controlling computer.

more.com). Individual tube types are often available on Ebay at various times.

To access these tubes the four screws on the top plate of the vertical amplifier have to be removed and the entire amplifier lifted out. Some of the other tubes in the OS-8 are difficult to remove since you cannot always get your fingers around them. In order to remove the 6J6 sweep generator, I had to make a handle by slipping a piece of 5/8-inch ID radiator hose over it. Then it came out very easily. Hint: keep a piece of radiator hose with your tube pin-straighteners!

Although the response of the vertical amplifier is just 2 MHz, the back plates are easily accessible and can be connected to a tuned circuit for vertical deflection with a transmitter at any frequency. But be careful, there is high voltage on some of those terminals under the back plate!

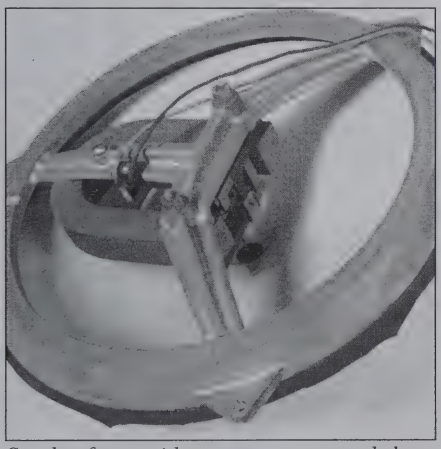
Due to its small size, the OS-8 is always ready on the bench for trouble-shooting and has proven very useful as a monitor. It is also a pleasure to see that old Navy equipment in operation again. I've included a picture showing my OS-8 in use monitoring electrical fluctuation in semiconductors. The HP 302A Wave Analyzer next to it is operated by stepping motors that are controlled by the computer. The computer also collects and processes the data automatically.

My most recently published work using this equipment appeared in *The Journal of Physics CM*, March 20, 2000. Reprints are available upon request. An article on how I built my electronics benches appeared in the June 2000 issue of *73 Magazine*.

FIRING UP A WESTERN ELECTRIC 34-A, *continued from page 30*

215-A			205-D Ampl.			205-D Rectifier	
grid	filament	plate	grid	filament	plate	grid/plate	filament
+115	+120	+160	+95	+122	+410	0	+420

But wait—that's not all. Along with the 34-A came a wall-mounted speaker and its gold-painted frame assembly. To minimize the depth of the speaker, Western Electric placed the horseshoe magnet and associated parts of the driver unit inside the cone, so what you see from the back of the speaker is just the cone and the central point where the movable armature wire is fixed. As with many of these old speakers, the high-impedance coil is open, so the unit is mute. A braver man than myself might take the speaker apart and wind a new coil the same size using heavier wire, but not me, not this time. You can also see two small decorative cover plates over holes for rotary controls—optional selector switch and volume pot?



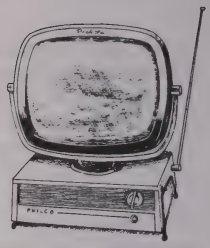
Speaker frame with paper cone removed shows location of driver unit (see text).

So here we have another hint how the 34-A might have been used back in the mid-twenties: say, in a hotel or a school where a rudimentary public address system would have one or maybe more amplifiers plus a number of speakers, wall-mounted one to a room. With one or two watts available from each amplifier, I'd guess four to eight speakers could be connected to share that much power and still get modest volume in a quiet room. The ability of the 34-A to handle different loads by changing the wiring of the output transformer windings points to this kind of flexibility—another feature lacking in the old Model 25 "space heater." ◙

Acknowledgement: The author wishes to thank Mr Chong Ong for providing the WECO units described in this article.

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



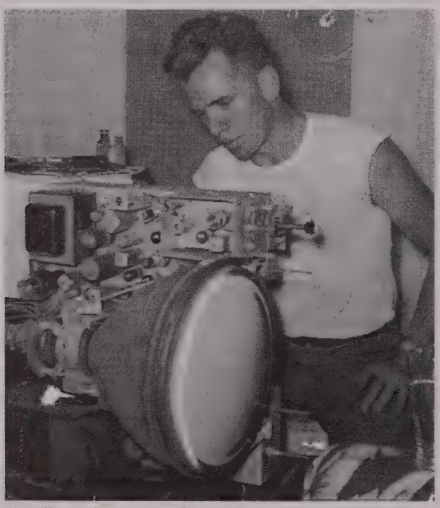
Adventures of a TV Serviceman—Part 1

I first met Art Kingsley in 1971, shortly after my move to New York. We soon became close friends due to our mutual interest in the antique radio hobby. Often I had suggested that Art let me publish his early TV service stories, especially since he had worked in the business ever since television had just begun to get off the ground in 1946. Here are his remembrances of those early years.

The Beginning

Art's earliest exposure to TV was in 1939 at the World's Fair when he was televised—closed circuit—to a TRK12. Seeing himself in the mirror lid of the set really baffled the 16 year old! When he actually began his TV service career, the venerable pre-war TRK9 & TRK12 were still in use. Art was discharged from the Air Force in 1946 and went to work at a Newburgh appliance store that started him at $62.50 for a six day week!

One of his jobs was to install new sets in customers' homes. But before he left the shop, he had to install the separately-packaged picture tube on the chassis. He recalls that when color sets became available in the mid 50s, the same procedure was required. But then the set had to be de-gaussed and converged as well. RCA service instructions advised that only about 70% convergence could be expected. It's amazing that people paid the $1000 plus price for these sets!



Art Kingsley at work on a set in the early 1950s.

Early RCA Color Experiments

During the early experimental years of color TV, Art would come in to work in the morning and turn on a b&w set to see what was happening. RCA was transmitting an experimental color program on channel 4 when the other 2 stations were just putting out test patterns. (In those days many stations didn't have shows on until the afternoon. There was no tape then, just live and film.) It seems that they were operating on a somewhat different line and frame rate and Art would adjust the horizontal and vertical controls until he could see something.

He explained that "The Zenith set, because of its 'quadrature' coil, would let you vary the horizontal frequency much widely than with the average set. So I was finally able to get six duplicate pictures on the screen! The scene was often of a young lady combing her hair, applying makeup, etc. There was no sound but I guessed it was color because of the unusual texture of the b&w picture. This went on three or four days a week for a long time."

Even before that, Art witnessed a CBS mechanical color wheel demonstration in New York City and pronounced the color, "very good."

The RCA 630

During the early years of television, Newburgh became known as "television city" thanks to David Sarnoff, president of RCA. He wanted

a location reasonably close to New York City and yet far enough to be called "deep fringe area." (In 1940, Newburgh was blitzed with special offers to entice people into buying the expensive early sets when there was usually only a few hours of TV a day.) The RCA engineers would occasionally visit Art's store with experimental TV sets, antennas, boosters, etc. He noted that, "I would like to think that some of the sync stability circuits of the famous '630' were developed through visits to our store."

TV Repair Pains

Besides all the repair problems the serviceman had to contend with, there were those dangers posed by exposed high voltage points. Risks were presented not only by the 10 to 15 kV picture tube voltages but also by the B+ boost voltages. OSHA would definitely not understand if some of these conditions existed today.

Art recalls that, "You could always tell an early TV repairman by the dozens of small scars on his arms, caused by hurriedly ripping them out past the sharp CRT and deflection yoke supports after touching a high voltage point! Another problem was the extreme heat generated by some of the vacuum tubes (5U4s, 6K6s, etc.) and who can forget grabbing a 6BG6 with cherry-red plates and the cap filled with molten solder? Oh joy!"

Houses of Ill Repute

There were quite a few such places in Newburgh and, for some reason or other, they usually bought their TVs and appliances from Art's shop. Getting in to service these things presented some humorous, unusual, or downright dangerous situations. One such establishment consisted of a street-level bar with the other activities.

Said Art, "I'm afraid that I occasionally interrupted some very serious business in order to conduct my repair work. One time I was servicing a TV set for a sixty-ish lady without a tooth in her head who was wearing very skimpy clothes. During the whole time I was there she was propositioning me for the price of the repair. I couldn't wait to get out! The price of the repair at that time was not much more than $5!"

Post-War Servicing

Television sales literally exploded after the

(continued on page 37)

Art's home museum includes most significant sets of the early radio years.

RADIO REPRODUCERS

EDITED BY **DAVE CROCKER**, 35 SANTUIT POND RD., #4B, MASHPEE, MA 02649
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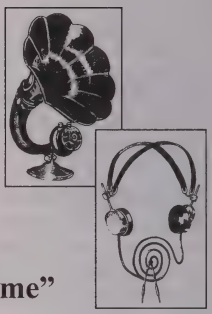


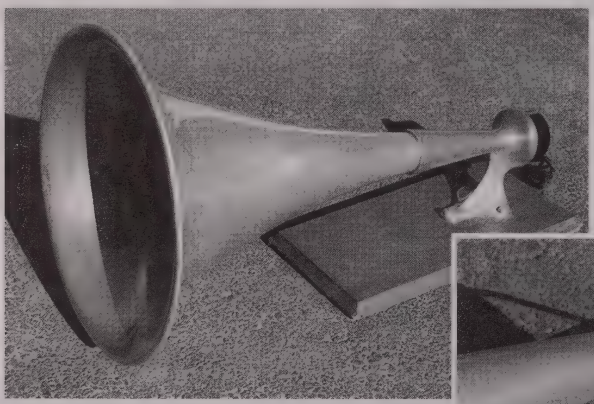
The "Githens Truetone" Alias the "Jerome"

One of the more outlandish radio speakers to appear on the radio scene of 1922 was the "Githens Truetone" horn speaker. The manufacturer was the Auto Parts Manufacturing Company of Detroit, Michigan, and their first ad appeared in the August 19, 1922 issue of *Radio World* a weekly newspaper-format publication. It showed an extremely long trumpet-style straight horn mounted on a flat platform. Its price was $21, which also included a Baldwin driver.

This same horn speaker appeared next in the November, 1922 issue of *Radio Broadcast Advertiser*. This time it was called the "Jerome" and was sold by the Jerome Radio Corp. of Chicago, which also announced a line of complete radio receivers. No mention of a price appeared in the ad, but it was the very same speaker.

This speaker is comprised of a 14¼-inch-long spun-aluminum horn with a 12-inch bell. This fits into a 6¼-inch-long cast aluminum mount, which accepts a Baldwin driver at the rear. The assembly is attached to a 12- by 7-inch walnut base. Total overall height is 12½ inches. The sound is obviously very directional.

One drawback of this speaker was that it was just too long to fit on, or anywhere near, a home receiver of the time. I'm sure it didn't win the aesthetic approval of the homemaker of 1922 either; there were a lot more stylish and compact speakers on the market to choose from. This must have led to the early demise of the speaker, making it the rare bird it is today.



Is it a "Jerome" or a "Githens Truetone?" This speaker has no manufacturer's tag anywhere, so its true identity is unknown.

Back end of the unit, showing cast-aluminum mount, Baldwin driver and detail of the walnut base.

Jerome Quality Radio Products
Jerome Loud Speaker
The silver tone of the spun aluminum horn with Baldwin receiver gives a new delight to radio entertainment.
Complete Receiving Sets
With "A" and "B" batteries, tubes, head-phones and loud speaker. It comes to you complete ready to use.
Write for Bulletin of Complete Line of Jerome Quality Radio Products
Jerome Radio Corporation
608 South Dearborn St. : Chicago

From the Radio Broadcast Advertiser *of November, 1922.*

***TELEVISION**, continued from page 35*

war. The veterans were being discharged from the service with their mustering-out pay burning holes in their pockets. Art was commuting to New York City every day to attend radio and TV service school and servicing on the side—learning while doing. Most other TV men were in the same boat.

"I shudder to think how little I knew then. Yet I was able to fake my way through many repairs. One thing I learned early on was that similar sets often had similar problems. I was often able to fix a set in the first 20 minutes, simply because I had seen the problem many times before."

The service man looked like a genius at times like this. On the other hand, new and strange problems could make a fellow look totally incompetent. Many of the problems that occurred in these early days were being seen for the first time. The new names left the radio service man shaking his head—quadrature coils, horizontal drive, Barkhausen oscillations, negative video, dc insertion, B+ boost, ratio detectors, etc. To compound the problem, different manufacturers would give a similar circuit different names in order to get around patent constraints!

Many of these early sets didn't have AGC and their operation was greatly affected by distant, high flying airplanes. First the picture would get very bright and then go dark as the plane moved in our vicinity. Both positive and negative ghosts—singly and in multiples—caused viewing difficulties. "Sync problems multiplied, that's why I have grey hair today!"

Interference

Most of the sets of the 40s and 50s had the old 21 MHz i.f.s. Transmissions from emergency vehicles and taxis fed straight through into these sets causing blanking of both sound and video. All day, every day! One solution was to make short stubs of twin lead and connect them to the antenna terminals. "By connecting them to a rotary switch," explains Art, "we were able to minimize some of the interferences. Each stub was cut so that a particular type of interference could be eliminated."

Motors of all types also raised havoc with these early sets, which were trying to contend with very weak signals. Another particularly annoying type of interference was caused by RF sealing machines used in pocketbook factories that were located all over the city. As each machine was operated, it blanked out both picture and sound on any set within 4 or 5 miles.

During Easter and Christmas time, these factories worked double shifts, moving the problem into prime evening viewing hours. The customers generally vented their spleen on the harassed repairman. Art noted that, "You developed a very tough hide through this treatment."

One method of attenuating such interference, besides the use of monster antennas and boosters, was to take a piece of aluminum foil about 8" long, wrap it around the twin lead coming into the set, and slide it up and down to where it would give the best possible picture. This really worked quite well, according to Art.

BREADBOARDING

EDITED BY **RICHARD A. PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
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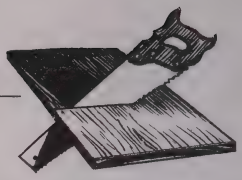


Bring Historical Circuits to Life On Your Workbench!

Big Tubes — Little Tubes

Over the years I've piled up a few boxes of strange and wonderful tubes—gas thyratrons, phototubes, small oscilloscope tubes, some "lighthouse" tubes from World War II, subminiature tubes, you name it! By now, you can't get your feet under my workbench for all those boxes, and they harbor lots of dust and not a few spiders. On the theory that some readers of *The OTB* may share this pack-rat trait, let's see if we can gin up a couple of experiments that might let us get some use out of all that junk. Might evict a few bugs, too.

I thought I'd start small—subminiature tubes are cute, and you can use a neat little Radio Shack breadboard (part no. 276-169) with a jumper wire kit (part no. 276-173) to check out

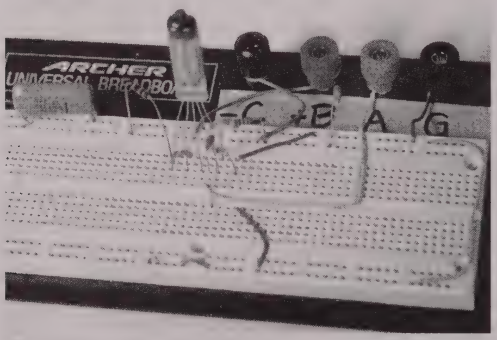


Fig. 1. Breadboarded CK733 Stage

most any subminiature tube. Most of these don't show up in tube manuals, but the rise of the internet has led at least one enterprising Ham to list lots of submin types on his web site. I found his stuff at http://pw2.netcom.com/~wa2ise/radios/penciltubes.html, and when I e-mailed him about his site, Bob (WA2ISE) gave me some hints on using these little tubes.

On my breadboard, I set up a simple amplifier stage (Figure 1) and tried a couple of tube types.The tube shown is a CK733 hearing aid type, having a 1.1 volt filament and designed to run with no more than 30 volts of B+. In the picture you can see the strip of masking tape I added to identify the power input jacks. I also added a fourth jack to allow for bringing in a "C" supply—a negative voltage for separately biasing control grids.

With this lashup, I could vary the applied voltages from external sources (not shown) and measure the gain of the amplifier stage. I could change coupling caps, load resistors, and so forth at will and see the changes that occurred in circuit operation. For a signal source, I used a lab oscillator, but something as simple as a 6-volt power transformer with a resistor network to get different voltages would work, too. I watched tube voltages with a pocket VOM and could also monitor the signal with an oscilloscope on my bench.

The circuit for a more elaborate amplifier that I put together next is shown as Figure 2. Figure 3 shows how the amplifier circuit took shape. The transformers are little round black "DOT" transformers that I've been hoarding for years. If transistors had never been invented this would be a neat little circuit. It has about 15 dB of power gain when loaded by 150 ohms. I had to keep the plate current below about 1 ma. because of the extremely fine wire used in the transformers!

Using a breadboard like this allows you to examine circuits in detail. I even constructed "characteristic curves" for the 5645 triode by making a series of measurements of plate current and voltage for different values of grid bias. Figure 4 is a cleaned-up plot that I came up with.

Circuit designers can use a set of curves like Figure 4 to help set up a circuit using the tube. One can choose an "operating point" for an amplifier stage, and it's possible to plan in advance what its voltage gain will be. This topic is covered in textbooks and the Ham *Handbook*, too. We won't pursue it here. But breadboarding lets you develop circuits by trial and error, and that's

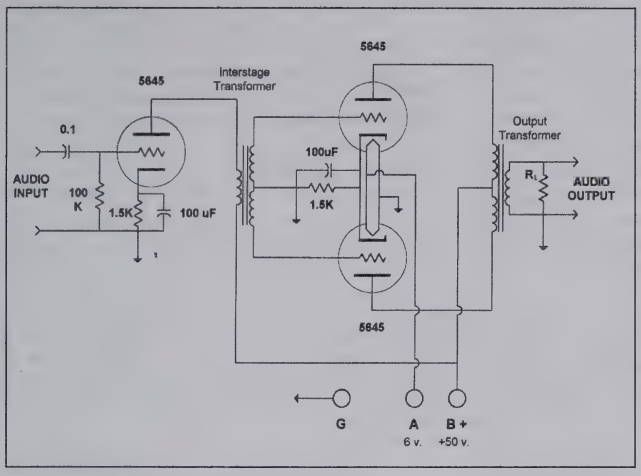


Fig. 2. Three-Tube Amplifier Schematic

highly historical! So much for subminiature tubes—now for something completely different!

Warning! The next circuit we'll discuss contains dangerous voltages that can cause severe burns, shocks, or death. You must observe extreme caution in constructing and operating it. Neither *The OTB* nor the author will be liable for any injury you may sustain!!!

I have a friend who haunts hamfests looking for high-power audio and transmitting tubes. Now and then he brings me a few to test. Now these are not going to be compatible with your prized TV-7 tester; to begin with you usually need mucho filament power just to light them bottles up! Here's how I give my pal a go-ahead to sell or trade a good tube.

All you need is a data sheet for the tube you want to test, a few items from your junkbox and a couple of fairly heavy Variacs. In my shop I have two of these: a 22 amp model that drives my entire workbench, and an 8.5 amp Variac that's built into a ten-inch Bud box. Figure 5 shows how to connect a pair of Variacs in a breadboard circuit for power triodes like the 211 or 813.

T1 is a power transformer from a junked microwave oven. These babies can deliver a kilowatt for minutes at a time, at a voltage of 1000 volts and upward. In the oven, there's also a high-voltage silicon rectifier. It's connected as a half-wave rectifier to operate the magnetron that cooks your dinner for you. You scrounge both of these items for your plate supply, and include a filter capacitor if you have one good for about 1500 volts DC That's roughly equivalent to a 1000 volt AC oil capacitor—I had a couple of these in my junk box. Make sure of the polarity of the diode! Since my handy pocket digital VOM will fry with more than 600 volts input, I used the three 100 K two-watt resistors to divide the tube plate voltage by a factor of 3.

Caution! Before setting this circuit up, you need to make sure that you know which side of your AC line is the cold, return, or ground side. If you don't, and you get across any connection that's sitting at 115 volts or more above ground, (e.g. the floor of your shop), you'll get a nasty shock at least.

I make connections to the tube under test with well-insulated test leads with oversize alligator connectors. Note that one side of the high-voltage transformer goes to the cold side of the filament Variac through the DC ammeter. This meter will measure cathode (plate) current when the lashup is turned on. When everything is connected, put one hand behind your back and set the filament Variac at the correct filament voltage for the tube, according to the data sheet.

Then you cautiously advance the plate Variac while you look at the DC voltmeter measuring one-third the plate voltage. If it reads backward or negative, your rectifier is connected backward! If your meter reads correctly, run the volt-

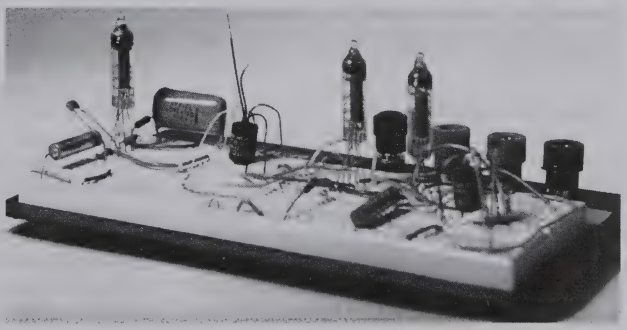


Fig. 3. Breadboarded Three-Tube Amplifier

age up slowly until you start to see plate current flowing.

Bearing in mind that the grid is connected to the filament or cathode, take a look at the characteristic curve for the tube — it will look like Figure 4—and see whether the values you're reading for plate current and voltage fall on or near the curve for zero bias at 200, 500, 1000, or whatever voltage you're applying to the plate. If so, you've got a good tube. If not, the tube's cathode emission is probably low. Take care: the tube's plate may glow red if you leave power on too long at the higher plate voltage settings. You need only keep the power on for long enough to take a pair of readings!

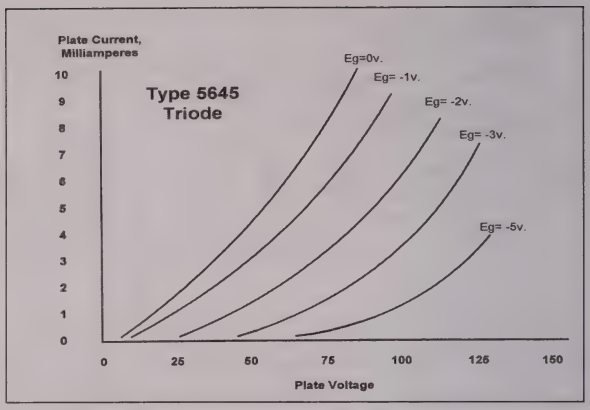


Fig. 4. Characteristic Curves for the Type 5645

After taking your measurements, you can zero the Variacs and start using both hands again. Even though the test circuit isn't very well filtered, the plate voltmeter will be reading the average value of the DC plate voltage, and the cathode meter, though it will be carrying mostly an ugly half sine wave, will register its average just fine. Tubes like the 211, that were delivered with thoroughly thoriated tungsten filaments, get tired cathodes after long hours of use—the thorium atoms near the filament surface get used up, raising the work function of the filament and lowering emission. Now and then you can "flash" a tube to pull some more thorium atoms toward the surface of the filament. Read up on that elsewhere—it's seldom worked for me.

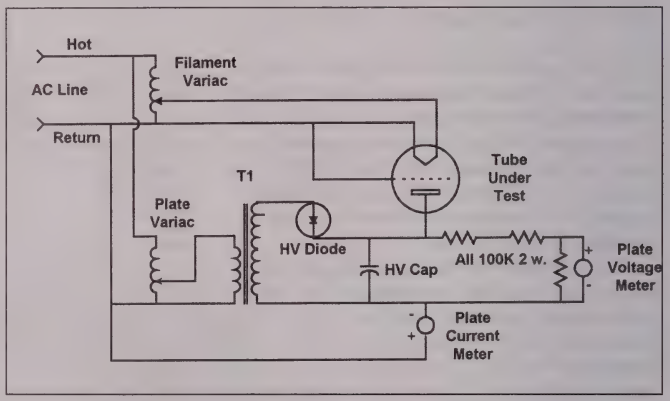


Fig. 5. Test Hookup for Power Triodes

Acknowledgement: WA2ISE's web site (see text)—lots to look at!

From the Mailbox

Thanks to those who've written to this column! **Karl Laurin**, of White Oak, PA, wrote to suggest a way to make an isolated C supply for the breadboard power supply in *OTB* Vol. 40, No.2. I haven't tried it yet, Karl, but a nine-volt battery would last forever. **Phil Taylor** of Sussex, England had some ideas on finding high inductance chokes for coupling between regen detector and amplifier stages. He sez a guy could even make one if he were desperate enough! Ten thousand turns of #42AWG on an old choke core will do the trick—about 40 Henrys. Here's one from **Rod Newkirk** of Ottawa, Canada: one evening in 1946, he was tuning up a home brew regen set while his Dad was trying to listen to a weak summer KMOX signal. Suddenly the parlor set got loud and clear, but faded back when Rod shut down his set and went to listen to the

game! Whenever Rod's detector was powered up but not quite oscillating, the superhet in the parlor (and another in the kitchen) both got a better signal! Talk about multiplying Q!

A very learned letter from **Derick Ovenall** of Wilmington, DE offered another instance of the "magic angle" used by Professor Hazeltine in the Neutrodyne receivers; it turns out that, in order to achieve the sharpest possible images of human innards, there was need to minimize magnetic coupling in the field of Magnetic Resonance Imaging (MRI) instruments. This drove designers to arrange certain equipment components at the same angle Hazeltine had derived. One more—**Sam Sargent**, from Gilford, NH asked about why we hook our antennas to the little coil inside a variocoupler and connect the tuning cap to the larger winding. I'm afraid my answer took four paragraphs and wandered badly. Simply put—you gotta tune your tank to the frequency you're seeking. Then make your antenna coupling as loose as possible for good selectivity.

SILENT KEYS

We record the passing of the followingAWA members with deep regret.

TED BABCOCK, (1-13-01), electrical engineer. He worked in the fields of electronics, aerospace and optics. Ted was an avid collector who specialized in Stromberg-Carlson equipment, and authored reports on the 1999 and 2000 Rochester Conference for *The OTB*. He was the twin brother of AWA Director Larry Babcock.

ERNEST L. DAWSON, (1-18-01)

JIM MCKINNON, (1-01)

STEWART MERSON, (1-1-01) AWA Electronic Communication Museum volunteer.

WILLIAM I. ORR, W6SAI (1-24-01), see below.

ROBERT F. WRUCK, (10-29-99)

Note: AWA officers and members are requested to submit all information about Silent Keys, with or without special recognition, to Joyce Peckham, Secretary, Box E, Breesport, NY 14816. This will help in the collection, coordination and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

WILLIAM I. ORR, W6SAI

Contributed by Lud Sibley

Bill Orr, retired manager of tube applications for the amateur-radio market at Eitel-McCullough, Inc., died January 24 at the age of 81.

Orr got his first amateur license as W2HCE in New York State at the age of 15. The far more famous W6SAI call sign came during his time as an electrical engineering student at the University of California at Berkeley. He worked for the Radio Test Department of Douglas Aircraft Company during World War II, and later for Hughes Aircraft Co.

He joined Eimac ca. 1960, working there for 28 years. His "Amateur Service Newsletters," columns in the amateur press, and long series of transmitter-construction articles made him a still-familiar name to the amateur community.

Bill took part in numerous DXpeditions (as FP8AC, 3A2AF, and ZL0SAI), and later contributed to Project Oscar/AMSAT. He wrote numerous books on antennas (*The Beam Antenna Handbook, The Quad Antenna Handbook, The W6SAI HF Antenna Handbook, etc.*) and edited several issues of the *Radio Handbook*.

He did some valuable writing for AWA: a history of Eimac (*OTB* Vol. 12 No. 3), a study of the origins of the UV-204A tube (*OTB* Vol. 22 No. 1), an anecdote of his boyhood encounter with Reginald Fessenden (*OTB* Vol. 31 No. 3), and, with the late Hank Olson, a KFS-Federal Telegraph-Mackay Radio history (*AWA Review*, Vol. 8).

I was privileged to work with W6SAI in preparing his *Review* article for publication; he was a real gentleman.

Cards and letters may be sent to Bill's son, Mr. James Orr, 645 Woodland Ave, Menlo Park, CA 94025, E-mail W6SAI@hotmail. com.

KEY AND TELEGRAPH

EDITED BY **ROGER W. REINKE**, 5301 NEVILLE CT., ALEXANDRIA, VA 22310-1113
PLEASE INCLUDE SASE FOR REPLY.

The Vail Register

On Friday, May 24, 1844 at 8:45 a.m., the telecommunications era in the United States began with the successful receipt of the message "What Hath God Wrought." That message was received on a telegraph register designed by Alfred Vail.

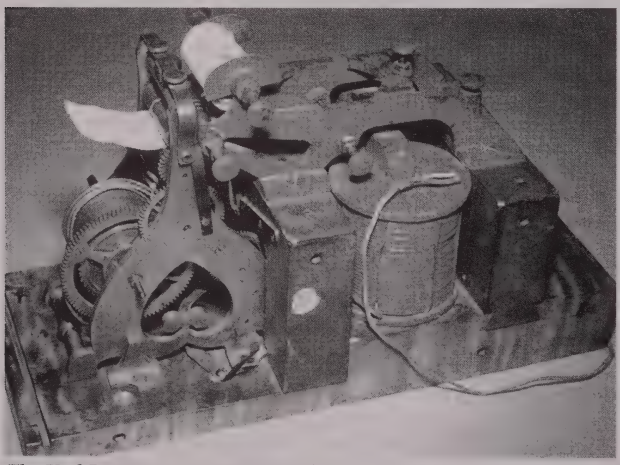
In preparation for my article, in the last issue, about Morse's farewell message, I started to accumulate material about the Vail register and came to feel that its historical significance demanded a separate article. The register, along with the labors of its designer, has received minimal recognition over the years. I recently had the unique opportunity to spend two days examining this national treasure at Cornell University. In this article, I will attempt to describe and document what I found there.

On March 3, 1843, a bill granting 30,000 dollars for an experimental telegraph line was passed by the U.S. Senate and signed that same day by President Tyler. Samuel Morse named Vail as one of his three assistants, giving him responsibility for superintending the machinery requirements for the new line between Washington and Baltimore. Vail, in his March 21st acceptance letter to Morse, states his responsibilities in part:

"*As an assistant...I can superintend and procure the making of the instruments complete according to your direction, namely; the registers, the correspondents with their magnets, the batteries, the reels, and the paper...*"

Work began on the instruments shortly thereafter. Vail's design for two registers was finalized in early 1844 and his drawings were given to Mr. John Stokell, a New York City clock maker, for final assembly. On April 1, 1844 the construction of the aerial line began in Washington under the supervision of Ezra Cornell. One of the two registers built was placed at the Capitol under Morse's control. The second register was transported from place to place by Vail, in order to test each new segment of the line with Morse as they progressed north towards Baltimore.

After Vail received that historic message in Baltimore, he kept the register in a hallway case at his home. He passed away in January of 1859 and, in his will, bequeathed all his telegraph instruments to Samuel Morse with the exception of his Baltimore register. That was willed to his eldest son Stephen. Stephen Vail had the register until 1873 when it was loaned for two consecutive exhibitions, first at The Metropolitan Museum of Art in New York City until 1876/77, then, at the National Museum in Washington until 1898.



The Vail Register as it appears today.

During 1897, Vail decided to sell his father's register and offered it to Mr. J. Schurman, the president of Cornell University at a "reduced" price of 1000 dollars. Schurman, who "*knew of no one willing to give 1000 dollars for this purpose*,"gave Vail's letter to Professor R.H. Thurston, who suggested that Vail write each of the seven trustees of the University. A positive re-

sponse was returned from representatives of the estate of Hiram Sibley, which provided the funds for its purchase. Both Sibley and the University's founder, Ezra Cornell, had deep roots in the history of the telegraph in America.

In March of 1898, Vail directed the Smithsonian Institution to box the register and ship it to Cornell University, where it has been ever since. The Smithsonian was obviously disappointed with its departure. According to Vail "*..they have expressed great desire to purchase it, but funds were too low.*"

At first glance, photographs of the register give the appearance that the instrument is large and imposing; but it's not. The dimensions are $13^{11}/_{16}$" long, by $5^{15}/_{16}$" wide, with an overall height of 8 inches. The device actually consists of two separate assemblies; a register and a clockwork.

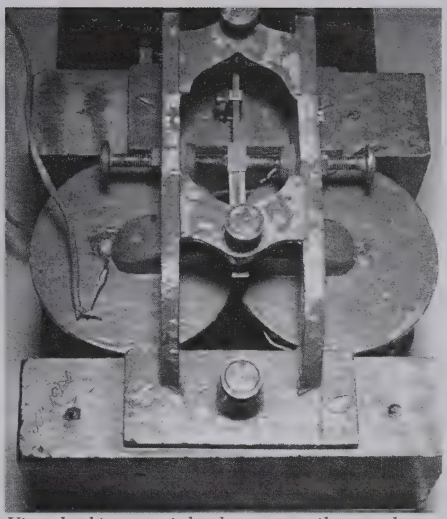
The register portion consists of the magnets, the pen lever, the pens, and a grooved roller. The magnets, which are imposing, measure 3 inches in both diameter and height. The coils of the magnets are wound around cores of soft iron joined together by a bottom plate to form a horse-shoe pattern. The copper wire is insulated with cotton that has been saturated in shellac. The wooden discs capping the windings at the ends of each coil are held in place by being pulled together with binding wire.

It has been documented that the magnets used in the relays on the Washington-Baltimore line were wound with 16 gauge wire. Morse and Vail thought the wire size needed to be as close as possible to the size used for the line (also 16 gauge). Measuring one of the wire stubs protruding from the top of the register's magnets, using a set of outside calipers, it was not surprising to find 16 gauge wire used here too. The resistance across the two coils, measured at the stubs with a Fluke 87 DVM, was 1.2 ohms, consistent with the wire gauge wire used in the windings.

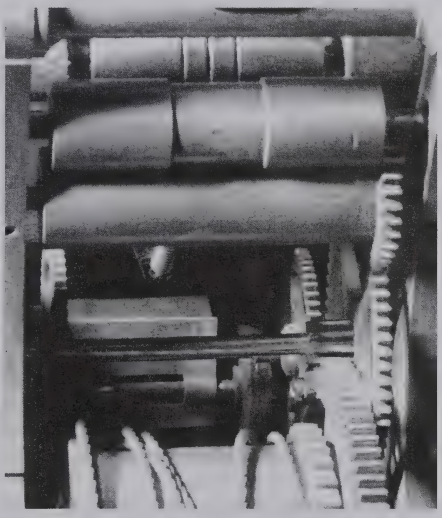
Three steel pens with blunt points are used in the register. The center pen is threaded directly through the pen lever. The other two pens are held against the sides of the lever with straps. They thread into a top plate which allowed the center pen to pass straight through. When current passes through the coils of the magnets, the pen lever pivots upwards forcing the pens against the paper and into the grooves of the roller. The steel roller, with three grooves, spins freely on its pivots and allows the paper to flex within its grooves by the pressure of the pens, embossing the marks that indicated dots and dashes.

Early pen experiments included the use of lead and ink, but Vail's design using a steel stylus was the most efficient and maintenance free way to print. Morse referred to Vail's steel stylus as *point se'che*. With the high reliability of Vail's steel stylus, the redundancy of three pens, a left-over from earlier designs, proved unnecessary. A single pen was used in later designs found in the U.S.

The original pen lever return spring is missing. Vail had used a long steel wire spring that



View looking straight down at coil tops shows pen lever in its pivots.

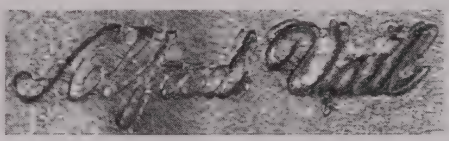


Vanes of governor can be seen directly above cable drum.

Triple-grooved roller, and the three steel pens directly beneath it, are visible through slot in register frame.

went from a binding post, on the top end of the register, to a yoke on the bottom of the lever near the pens. This wire ran almost parallel with the lever. In its place is a much newer coil spring going between the bottom of the pens to a new arm near the clockwork. The original spring still appeared in photographs taken in 1895. A replacement spring could easily be made, though, and all of the original mounting hardware is still there.

The sole function of the clockwork was to transport the paper. The power to drive it came from a weight suspended below the register by a cable that passed through holes in the register's base and the operating table. As with early weight-driven clocks, the weight was wound up by using a clock key or crank that turned the brass drum within the clockwork, which, in turn, ratcheted the cable up onto the drum. The clockwork is set in motion by the releasing of a "break," a brass lever on the side of the register that pressed up against a small wheel on the axle of the governor.



One of the nine Alfred Vail signatures engraved in the register's wood base.

The simple fixed-pitch, two-vane governor is set an inch into the wood near the bottom of the clockwork. It helped maintain a constant speed by spinning against the resistance of the air. The governor shows a very early modification. On top of the leading edge of each vane is a copper strip that was attached by poured solder. This increased the overall surface area of the vanes by 31 percent, providing additional drag to slow down the clockwork.

The paper is 1.5 inches wide and a small amount can be wound on a metal spindle that is supported by two pivots. The brass half-circles, which are fixed and part of the frame, serve as guides. A separate 15"-diameter reel was used to supply the paper after the experimental line became operational.

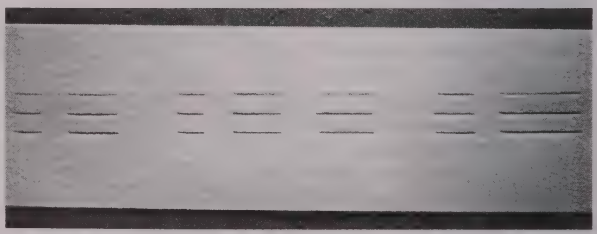
The magnets and brass frame are painted in a bright red paint that is fading and chipping from the brass. A carpenter's scribe marks are still visible where they were used for centering, and to outline the cutting of the dovetail joint. The hardwood base appears to have been coated with shellac and the bottom was left untreated. The brass clockwork is just press-fitted in place within its four anchors.

Unlike the angelic harp-like registers that were used in the 1850-60s, this instrument's design is a practical one. The solidly built, 157-year-old register could go back to work tomorrow if required. With fresh connections to its magnets, a weight, and a reel of paper, it would perform effortlessly all day long. All of its stops are still adjusted perfectly to produce a clear print sample; almost as if it had been just pulled out of service. The last significant demonstration of its abilities appears to have been in 1944, for a centennial encore of the first message.

The sound of this instrument is quite impressive. When the pen lever is depressed against its stops, it produces a deep solid sound that is fully absorbed within the base. None of its resonance makes it to the table underneath. There is only a trace of reverberation coming from the "new" spring.

You may be wondering what happened to the register at Morse's station in Washington. In a

(continued on page 48)



Sample tape made by pulling tape through register with one hand and manually actuating pen lever with the other.

BELOW 535

EDITED BY **FRANK LOTITO, K3DZ**, 1428 O'BLOCK RD., PITTSBURGH, PA 15239
PLEASE INCLUDE SASE FOR REPLY.

A Practical Demonstration of What is Possible at LF

Introduction

How far can you get at LF with a modest antenna and transmitter? Definitely a question many of you want answered if, as I hope, you intend to take part in an initiative to petition for formal North American amateur radio assignments below the standard AM Broadcast Band. You also want this question answered if, should it become legal, you decide to build an amateur LF station.

The answer can be found by SWLing (or should we say LWLing) the LF NDBs, (Non-Directional (radio) Beacons). Listening to the NDBs will ably demonstrate what could be routinely done if the North American Amateur Radio Service is given operating privileges similar to those enjoyed by our UK, Continental European, and South Pacific cousins. Many of the government NDB transmitters, antennas, and receivers are not that different from what an everyday amateur radio operator would use at LF for CW, AM and SSB communications [1].

The NDB Beacons

From the earliest days of radio technology, there has been significant emphasis on "radio direction finding/radio location." The use of radio to determine the location of an aircraft or ship, or to guide aircraft or ships, began prior to World War I [2]. Even today, this is an all-important topic employing state of the art technology a la "the Star Wars Missile Defense System" originally proposed by the Reagan administration.

The present LF NDB system, operating at 190-530 kHz, is a holdover from the post World War II era, actually the early 1950s. Beacons of this type were established almost world wide to provide a reasonably reliable and low cost [3] "close in" radio navigation service. But LF navigation beacon systems were installed and operated in this country, starting after World War I, by the CAA (predecessor of the FAA) and the US Coast Guard.

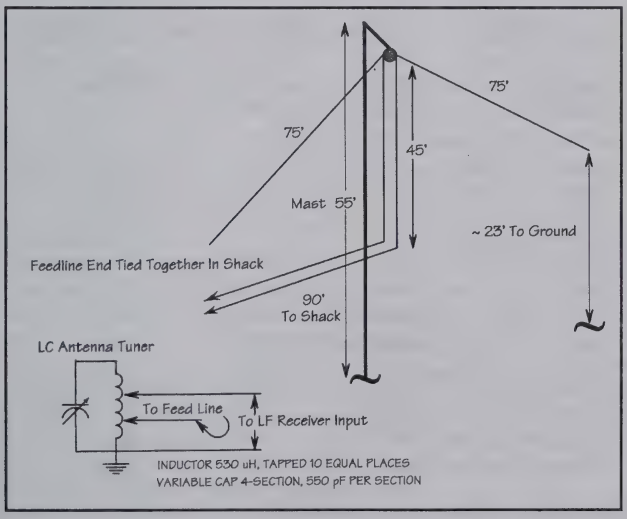


Fig. 1. K3DZs LF Receiving Antenna

Due to advances in GPS and new terrestrial systems, the role of LF in radio direction finding/radiolocation has declined in favor of potentially more accurate techniques operating at VHF through microwaves. The US Coast Guard has almost 100% weaned itself from the LF NDB service. The FAA is ready to do the same after

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Excerpts From VE3VIA's LF NDB Log

FREQ	CALL	ST/PR	LOCATION	DATE	TIME/UTC	POWER*
206	GLS	TX	GALVESTON	1.08	11:13	2000
216	ME	QC	MATANE	1.08	11:16	400
230	QB	QC	QUEBEC	1.08	11:18	500
343	6R	QC	BROMONT	1.08	11:27	40
395	XEN	OH	XENIA	1.08	11:43	25
212	JX	MI	JACKSON	1.08	11:45	25
391	CM	OH	COLUMBUS	1.08	11:46	50
362	SC	QC	SHERBROOKE	1.08	11:51	25
418	IY	IA	CHARLES CITY	1.09	12:29	25
411	SDA	IA	SHENANDOAH	1.09	12:33	25
230	BI	ND	BISMARK	1.09	12:43	100
233	BR	MB	BRANDON	1.09	12:45	50
260	PYA	NY	PENN YAN	1.09	12:56	25
344	AVN	NY	AVON	1.09	13:08	25
404	IUB	MD	BALTIMORE	1.10	11:36	25
245	FS	SD	SIOUX FALLS	1.10	12:33	100
317	VC	SK	LA RONGE	1.10	12:44	1000
198	DIW	NC	DIXON	1.11	11:31	2000
407	RZZ	NC	ROANOKE RAPIDS	1.11	11:40	25
235	GNI	LA	GRAND ISLE	1.11	11:45	2000
284	RT	NT	RANKIN INLET	1.11	11:55	1000
293	GHJ	NC	GASTONIA	1.11	11:58	25
417	HHG	IN	HUNTINGTON	1.27	22:33	25
419	RYS	MI	DETROIT	1.27	22:35	25

Excerpts from K3DZ's LF NDB Log heard Feb 7, 2000, around 7 p.m. EST

CALL SIGN	LOG FREQ	BEACON LOCATION	ACTUAL FREQ	POWER*
AK	358	Akron, OH	362	25
BHU	378	Latrode, PA	382	25
BKL	412	Cleveland, OH	416	25
CBE	312	Cumberland, MD	317	25
CFX	238	Cadiz, OH	239	25
CL	342	Cleveland, OH	344	250
HBD	404	Hubard, OH	408	25
MKP	286	McKeesport, PA	287	100
PNU	252	Washington, Pa	255	25
QG-(long dash)	350	Windsor, ON	353	25
RYS	416	Gross Ile, MI	419	25
UCP	270	New Castle, PA	272	25

*Transmitter power in watts from www.airnav.com/navaids and personal correspondence with N1XKH, "DX Downstairs" column editor for LWCA's *The Lowdown*, and from Kevin Carey's "BeaconFinder."

Table 1.

certain GPS implementation concerns are resolved.

Most LF NDBs are 25 to 100 watt stations. There are a few 1000 and 2000 watt NDBs that are primarily used for coastal navigation. Most NDB stations use modest "symmetrical T" or short loaded vertical antennas. The antennas' ground screen is certainly not spectacular. The intention of a NDB is *local* radio direction finding, not DX (worldwide) communications. Surprisingly, these modest local stations have been received hundreds, and even thousands, of miles away by the LF listening buffs!

Receiving NDBS

The NDB listener may use one or more of the following types of receiver:

a) long obsolete military surplus sets
b) old-model and surplus aircraft or maritime NDB and LF equipment
c) tuneable voltmeters covering the LF range
d) modern amateur transceivers using their "standard equipment extended range receivers" tuning to 200 kHz, or below
e) modern full ceramic/mechanical IF filter amateur transceivers with "alleged" higher-performance external receiving up-converters
f) a hodgepodge of performance-enhancing lashups that frequently includes a PC (personal computer) for the "modern modulation techniques" like PSK and "slow code"
g) state of the art sets that only a very few of us could afford to purchase

I am not an avid below the broadcast band listener. For a receiver I use a Sierra/Philco Ford Model 126B Frequency selective (tunable) voltmeter that tunes 5 kHz through 1.62 MHz in two frequency bands. Certainly not state of the art even in its day (the 1960s), but it is surprising what can be heard!

Receiving antennas used by the NDB enthusiast range from a simple wire strung out into the back yard to cutting-edge shielded ferrite loaded active loop antenna. It is interesting to note that the concept of shielded active loop antennas goes back to the pre-WW2 era [4]. I use my regular station antenna as a semi-symmetrical base-loaded "T" antenna (Fig. 1).

Excerpts From a NDB Listener's Log

Table 1 lists some of the stations heard recently by avid "LFLer" VE3VIA [5]. Some of the stations he monitored are well over 500 miles away! I have added a few columns giving power output and geographic information.

VE3VIA's equipment is modest: a Kenwood R-5000 receiver and homemade loop antenna. An excerpt from my own "casual listener's log" is also included.

I relied heavily on Kevin Carey's BeaconFinder [6] to look-up some of the details in both log excerpts. Some details were also obtained from N1XKH, the *DX Downstairs* column editor for *The Lowdown* [7]. Kevin Carey's BeaconFinder is a definite asset to the avid as well as casual listener for radio activity below 535 kHz. It gives the listener a very good idea what they are listening to, and where the station is located. The BeaconFinder covers the frequency range of 76 Hz, (yes, seventy six Hertz) through 530 kHz, and the "Expanded Standard AM Broadcast Band," 1610 through 1740 kHz.

Conclusion

Now I ask, what more proof is required to convince the skeptic that LF communication can indeed be realized by the everyday amateur radio operator? Obviously, trans-Atlantic LF DXing, even with the more state of the art PSK and "slow code" modulation systems has yet to be accomplished by amateurs using modest equipment. *NOTE: Since this article was originally written, a transatlantic QSO took place on 136 kHz between Laurie Mayhead, G3AQC, in the UK and Larry Kaiser, VA3LK, in eastern Ontario, Canada. However, the equipment wasn't exactly modest! —Ed.* But amateur communications over a few hundred miles certainly is an everyday possibility!

One last point: amateur frequency assignments will likely be at the proposed 72 and 132 kHz frequencies or within the present 160-190 kHz "no-license" 42 CFR Part 15 band. This means for equal height/length designs, our antennas are going to be less efficient than those employed in the LF NDB service. The reason is that for physically small antennas, radiation resistance decreases as frequency decreases.

Remember that the second "R" in ARRL stands for the word "relay." So what if we can't launch our LF signals coast to coast, or over the oceans. Maybe someday, using the LF bands, the AWA could reactivate an event involving the long forgotten pursuit of relaying messages coast-to-coast.

Web Sites With Information on NDBS

www.southernavionics.com/index.htm
Manufacturer of LF NDB beacons and antennas.

www.southernavionics.com/sac1a.htm
The company's line of 25 to 100 watt systems.
www.southernavionics.com/sac1a2.htm
The symmetrical "T" wire antenna.
www.airnav.com/navaids/
If you hear a NDB, plug in its two or 3 letter identifier to find the station's location and other particulars.
www.lwca.org
For North Americans, The Long Wave Club of America continues to be the primary source of information for the NDB SWLer—see also the club's monthly publication, *The Lowdown*.

FOOTNOTES AND REFERENCES

1. Some NDBs have been purchased, installed, and maintained by non-federal government entities, i.e. municipal governments, some are privately owned and operated.
2. H. Lauer and H. L. Brown, *Radio Engineering Principles*, McGraw-Hill Co., NY, 1920, first edition, Chapter XI, and P. C. Sandretto, *Principles Of Aeronautical Radio Engineering*, McGraw-Hill Book Co., NY, 1942, first edition, third impression, page 24 for brief information on pre-WWI "radio range" patents.
3. Cost to implement, maintain, and use by commercial enterprises and the public.
4. G. E. Sterling, *The Radio Manual*, D. Van Nostrand Co., Inc., 1938, third edition, second printing, Chapters 13 and 14.
5. Jacques d'Avignon, VE3VIA, 248 Towerhill Rd., Peterborough, ON K9H 7N1, Canada, (SASE please or e-mail to monitor@rac.ca)
6. Kevin Carey, BeaconFinder, P.O. Box 56, West Bloomfield, NY. 14585, or e-mail to kcarey@adaptivebroadband.com. See also Kevin Carey's column "Below 500 kHz" in *Monitoring Times* Magazine, available at most large newstands.
7. Published by The Longwave Club of America, 45 Wildflower Rd., Levittown, PA 19057

KEY AND TELEGRAPH, *continued from page 44*

conversation Stephen Vail had with Morse, Morse told him "*that the instrument in his charge at Washington had disappeared and he knew nothing of its existence.*"

It is clear that Vail wanted it known that he was the designer of this register. His signature is engraved into the wood base in nine different places. When the register was loaned for the Morse tribute on June 10, 1871, a handwritten note signed by Alfred Vail was found attached to the bottom:

"This lever and roller were invented by me in the sixth story of the New York Observer *office, in 1844, before we put up the telegraph line between Washington and Baltimore... I am the sole and only inventor of this mode of telegraph embossing writing. Professor Morse gave me no clue to it. ..and I have not asserted publicly my right as first and sole inventor, because I wished to preserve the peaceful unity of the invention, and because I could not, according to my contract with Professor Morse, have got a patent for it."*

The note Vail attached to this singular heirloom is convincing evidence that his wish was to isolate, protect, and provide for history both the register and a record of its significance. Vail's 1837 contract with Morse gave him a one-quarter interest in the invention, (later reduced to one-eighth) but he never realized any wealth from it. Significant wealth was made, though, by stockholders of successful telegraph companies.

Fortunately, thanks to the generosity of Cornell and Sibley, Mr. Vail's original wishes are effectively being honored.

SOURCES

New York Census Index, 1830
New York City Directories, 1842-1847
Description of The American Electro Magnetic Telegraph, Alfred Vail, 1845
Appleton's Dictionary of Mechanics and Engineering, 1852
The Telegraph in America, James D. Reid, 1879
The Century Magazine, April 1888
The Electric World, August 17, October 12,1895
The Dr. R.H. Thurston Papers, Rare and Manuscript Collections, Cornell University, 1897-1898.
Early History of the Electro-Magnetic Telegraph, J. Cummings Vail, 1914

THE VACUUM TUBE

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

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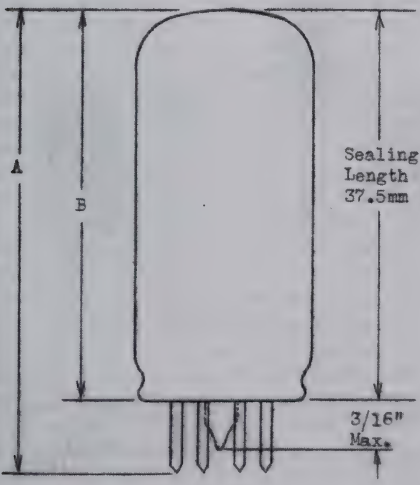
Introduction of the Miniature Tube

RCA, in its efforts to provide "hot" new tubes and outshine the competition, provided a long-run winner by introducing the "miniature" tube in late 1939. This was a useful development in its own right; commercially, it was also a countermeasure to Sylvania's loktal tube.

Both formats took advantage of the glass button-stem designed at RCA much earlier. (For details, see Bro. Patrick Dowd's definitive history of the metal tube, published most recently in *OTB* Vol. 33 No. 2). The new stem, unlike the "press" design carried over from light bulbs, involved molding wires in a circular array into a round glass button. RCA had originally designed an all-glass "bullet" tube, a GT-like design with hard, stiff pins molded into the stem, then set this idea aside in favor of the metal tube. With thin, soft wire the button stem was revived as a cost reduction in the metal line in 1936. Sylvania used the hard-pin idea in devising its loktal design, which was a highly advanced idea for 1938.

The miniature tube was a scaled-down button-stem style whose reduced size was a natural for portable radios and similar equipment. The initial product line was the 1R5 (dev. no. A5550), 1T4 (A4140), 1S5 (A5002), and 1S4 (A4175) [1]. These types were designed for use with a 45-volt "B" battery to save space. RCA at one time had plans to introduce a line of metal tubes for battery operation, but the miniature line was the end of that idea.



A5550C Bottom-Tip 1R5

A feature of the new design was that the electrodes were of the same height as in glass-octal battery tubes, so that a regular 1.5-volt, 50-mA filament could be used [2]. The 1R5 converter tube was basically a smaller version of the successful 6SA7, offering relatively high conversion transconductance and relatively low "pulling" of frequency with mixer grid voltage. The 1T4 IF pentode had internal shielding and automatic-volume-control characteristics coordinated with those of the 1R5. The 1S5 detector-and-audio tube was a diode-pentode so as to get more voltage gain with low B+ than a triode could give. The 1S4 output tube had dual, parallel filaments for increased emission; it produced a power output of 50 milliwatts with 45 volts B+.

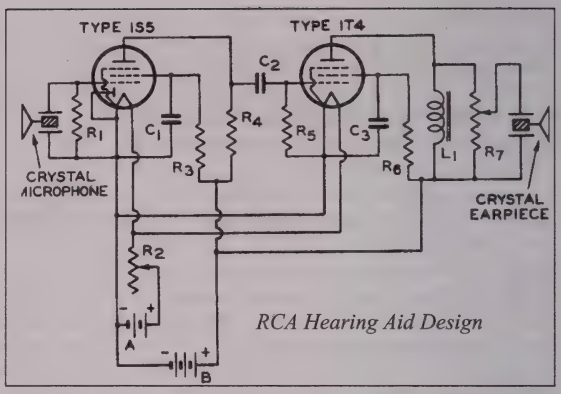
RCA must have done some "missionary selling" with the other manufacturers, because the original RCA Victor BP-10 "personal radio" was joined by sets from other makers - the Emerson FF411, Fada C34, GE JB-410, et al., with claimed sales totaling 150,000 sets in the latter half of 1940. Set designers could take advantage of such contemporary detail refinements as iron-core IF transformers and miniaturized B-batteries.

Incidentally, the RCA application notes warned against rocking a miniature tube when pulling it from its socket, this being a source of cracked bases. This is not bad advice today.

The original intention was to move the sealing tip to the base, yielding a shorter and more pleasing bulb. Application literature originally counseled the user that a center hole was provided in the tube socket to clear a future sealing tip. Drawings for the tipless 1R5 (A5550C) were dated December, 1940. It must have been a casualty of the ramp-up of production as WWII came near. The conversion was stopped early enough that there is no evidence in the Dowd-RCA Archive of other tubes in the line being redesigned.

The original line had potential for miniaturizing hearing aids, which were often so bulky in the '30s as to be table-top units. RCA recommended a simple 1S5-1T4 circuit [3].

To expand use of miniature tubes into AC-DC-battery portable radios, the 1S4 had its filaments reconnected in series for 50-mA series-string use, becoming the 3S4 (A4020). To power the string, the now-little-known 45Z3 (R6130A) rectifier appeared in 1941.



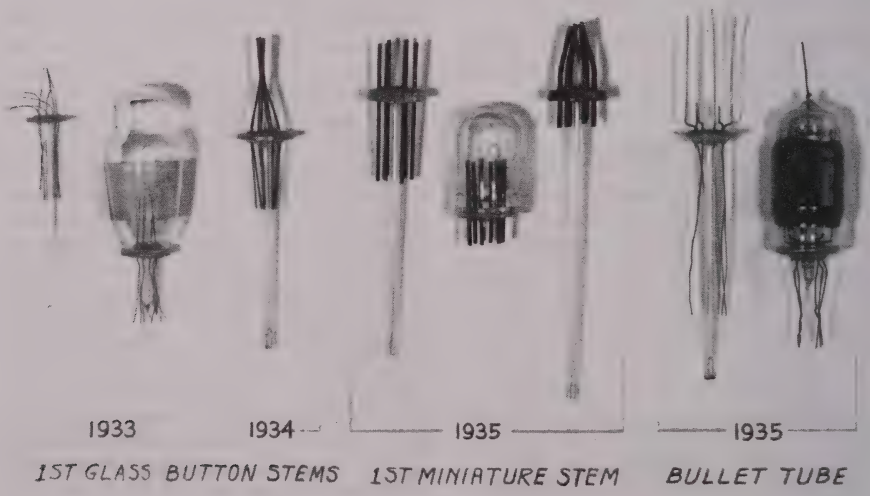
RCA Hearing Aid Design

These tubes were a "natural" for military use in gear being designed ca. 1940. They served in the Signal Corps' BC-611 handie-talkie and BC-745 transceiver, and the Marines' MAB paratroop transceiver. For the BC-1000 FM walkie-talkie, the discriminator circuit in the receiver required the diode in a 1S5 plus a separate diode with its cathode isolated from the filament, so RCA designed the 1A3 diode (R6161). (Sylvania's loktal answer was the 1R4, another member of the short list of battery heater-cathode tubes.) The BC-1000 also need a sharp-cutoff IF-amp tube, so the 1T4 was "regridded" into the 1L4 (A4310B). The 3A4 (A4314) power pentode handled uses like the transmitters in sonobuoys. For meteorological radiosondes and miscellaneous devices like the AN/PPN-2 paratroop beacon, the 3A5 (A4288A) dual triode was essential. The 1A3, 3A4, and 3A5 were important in military use long after the war, but had essentially no civilian application.

Miniature tubes lost their "battery" association early. RCA recast its 6.3-volt acorn types (954, 955, and 956) as miniatures, giving the 9001-2-3 family (A4264A, A4221C, and A4222C respectively.) Wartime types included the 6C4 (A2143E), which was originally described as a "power triode" despite its light (150-mA) heater, and which later appeared in all sorts of uses including phono preamps. The 6J6 (A4334E) was another important type that served well into the '50s. The story wasn't all RCA's: Western Electric's 6AK5 was a major advance in "hot" high-frequency tubes. The 6AJ5, a 6AK5 optimized for 28 volts on the plate, figured in wartime gear too.

After the war, the realization set in that a not-

(continued on page 53)



RCA Button-Stem Prototypes (Courtesy Bro. Patrick Dowd)

RECENT RADIO, TV AND ENTERTAINER OBITUARIES

COMPILED BY **CHARLES S. GRIFFEN W1GYR**
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Note: When known, the date of death is indicated in parenthesis.

VICTOR BORGE, 91, (12-23-00) Danish comic pianist. Borge was trained as a classical pianist but by the early 1930s he was adding comedy to his performances. In 1940, at the start of the Nazi invasion of Denmark, he emigrated to the United States where he resumed his career. Borge was heard on many radio programs including Bing Crosby's *Kraft Music Hall, The Kate Smith Hour*, and *Stage Door Canteen*. In 1943 *The Victor Borge Show* began on the Blue Network and continued on other networks until 1951. *The Victor Borge Show* debuted on NBC television in 1951. Other TV appearances include *All Star Revue, The Big Show, Omnibus* and *Paul Whiteman's Goodyear Revue*. In 1953 Borge's one-man theatrical show *Comedy in Music* opened on Broadway and ran for 849 performances.

LES BROWN, 88, (1-4-01), band leader. Brown, who formed his first swing band in 1936, was still touring and performing about 60 engagements a year as recently as five months ago. His *Band of Renown* scored a big hit with *Sentimental Journey* sung by Doris Day. The band joined *The Bob Hope Show* (NBC) in 1947 and later accompanied Hope on many of his trips to entertain American troops overseas. Brown's band also made television appearances on *Dean Martin Presents* (NBC 1968-1969), *The Hollywood Palace* (ABC 1964) and *The Steve Allen Show*.

JOSEPH J. CARR, 57, K41PV (11-25-00) technical writer. Carr wrote over 100 books including *Joe Carr's Loop Antenna Handbook, Joe Carr's Receiving Antenna Handbook*, and *Practical Radio Frequency Test & Measurement—A Technician's Handbook*. In addition, he authored over 450 articles for such publications as *QST, Popular Electronics, 73* and *Nuts and Volts* and was the "Antennas & Things" columnist for *Popular Communications*.

DALE EVANS, 88, (2-7-01) singer and actress. Evans, known as the "Queen of the West," starred in western films, radio and television shows with her husband, Roy Rogers. Among her 27 movie credits were *Cowboy and Senorita (1944)*, *Don't Fence Me In (1945)* and *My Pal Trigger (1946)*. Evans performed on many radio programs including *The Jack Carson Show* (NBC ca. 1944) and *The Edgar Bergen/Charlie McCarthy Show* (NBC ca. 1943). She costarred on *The Roy Rogers Show* (NBC 1946-1948). Her TV credits include The *Kraft Music Hall* (NBC), *The Nashville Palace* (NBC), *The Roy Rogers and Dale Evans Show* (ABC 1962) and *The Roy Rogers Show* (NBC 1951-1957). Evans was also a songwriter, and with Rogers recorded more than 400 songs.

ROBERT H. FORWARD, 85, (1-30-01) radio and television broadcaster. Forward began his radio career in 1937 as a jazz disc jockey in San Francisco. In 1939 he joined KFRC(AM) where he hosted Mark Goodson's first game show, *Pop a Question*. In 1949 he joined KTTV(TV) in Los Angeles where he assisted Ralph Levy with production on *Burns and Allen, The Alan Young Show* and *The Jack Benny Show*. Forward returned to radio in 1956 as a producer at KMPC(AM). Here he introduced such innovations as the first one-man news car and the Air Watch system of traffic helicopters. From 1978 until he retired in 1983 he was Executive VP and General Manager of KRLA(AM) in Pasadena, CA.

STAN FREEMAN, 80, (1-13-01) pianist, composer and conductor. Freeman is best known as the conductor for Marlene Dietrich's orchestra during the 1960s and more recently for his one-man show as Oscar Levant. During World War II he joined Paul Whiteman's Army Band as a pianist and met Levant while on tour. After the war Freeman toured with Tex Beneke's band and in 1947 made his classical piano debut at Carnegie Hall. In addition he performed in night clubs, made TV appearances on *Melody Tour* (ABC 1954) and *Three's Company* (CBS 1950), and contributed material to Mary Tyler Moore's and Carol Burnett's TV shows.

MARTY GLICKMAN, 83, (1-3-01) sports

broadcaster. Glickman covered New York City sporting events, mostly on radio, for fifty-five years. He was the voice of the Giants (football) for 23 years, of the Knickerbockers (basketball) for 21, Yonkers Raceway (horse racing) for 12, and the Jets (football) for 11. Glickman also did pre- and post-game commentary for the Dodgers and Yankees for 22 years. On television he co-hosted *Madison Square Garden Highlights* on ABC (1953-1954) and Dumont (1954), co-hosted *Greatest Sports Thrills* on ABC (1954-1956) and did commentary for *Cowtown Rodeo* on ABC (1957-1958). Glickman began his broadcasting career on WHN(AM) in New York City in 1939 and by 1943 was its Sports Director. He retired from WCBS(AM) in 1992 after his second tour with the station as the Jets play-by-play announcer.

AL GROSS, 82, W8PAL (12-21-00) wireless communications inventor. Gross invented the wireless pager and the cordless telephone and also pioneered citizens band radio. When he was 16 he obtained an amateur radio license and in 1938 built a hand-held radio which allowed him the freedom to talk to other hams as he moved around. He called it a "walkie-talkie." The device caught the attention of the Office 0f Strategic Services (OSS), which hired Gross, and by 1941 he had perfected the two-way radio which proved so invaluable during World War II. As the war ended he urged the FCC to adapt the walkie-talkie for civilian use. The FCC approved the idea and Gross was the first to be granted a citizens band license. He subsequently left the OSS to form the Citizens Radio Corp. From 1990 until his death, he was a Senior Principal Electrical Engineer for Orbital Sciences Corporation. He received the Lemelson-MIT Lifetime Achievement Award for Invention in 2000.

CHARLES J. GUSSMAN, 87, (10-18-00) soap opera writer. Gussman wrote for such radio serials as *The Road of Life, The Right to Happiness* and *Young Doctor Malone*. He once claimed 20 million listeners a day were tuned in to follow the trials and tribulations of the show's characters. Gussman also wrote for *The Ford Theater*. As television became the dominant medium he wrote for some of the first soaps in that medium, including *Search for Tomorrow* and *Young Doctor Malone*. Gussman wrote the pilot script for *Days of Our Lives* and gave the series its name. He also wrote some episodes of *Gilligan's Island*.

WILLIAM R. HEWLETT, 87, (1-13-01) co-founder of the Hewlett- Packard Company. He and David Packard started the firm in 1938 with $538 of borrowed capital and a single product—an audio oscillator. Today the firm is a global manuacturer of electronic and scientific instruments, calculators and computers. Last year the company split into two corporations: the Hewlett-Packard Company with revenue of $48.8 billion and Agilent Technologies Inc. with revenue of $10.8 billion. Hewlett resigned as President in 1977 and retired as Chief Executive in 1978. He then served as Chairman of the Executive Committee until 1983, when he became Vice Chairman of the Board. Hewlett was named Director Emeritus in 1987.

WERNER KLEMPERER, 80, (12-6-00) character actor. Klemperer was best known for his portrayal of Col. Wilhelm Klink on the CBS television series *Hogan's Heroes* (1965-1971). The part won him Emmy Awards in 1968 and 1969. He also received a Tony Award nomination in 1988 for his stage role in Hal Prince's revival of *Cabaret*. Other Broadway credits include *The Insect Comedy, Dear Charles*, and Chekhov's *Uncle Vanya*. Klemperer's film credits include *Death of a Scoundrel, The Goddess, Judgment at Nuremburg* and *Ship of Fools*. He also appeared as a narrator with many U.S. symphony orchestras and performed in operas.

STANLEY KRAMER, 87, (2-19-01) film producer and director. Kramer's films received 85 Oscar nominations and 15 wins, including those for Gary Cooper in *High Noon* (1952), Maximilian Schell in *Judgment at Nuremburg* (1961) and Katharine Hepburn in *Guess Who's Coming to Dinner* (1967). Many of his 34 films dealt with such social issues as racism, nuclear arms race, Nazi war crimes, and mental retardation. Kramer's final film, *The Runner Stumbles*, was released in 1979. Kramer, who started as a film studio laborer, worked his way up through the ranks and eventually formed his own production company.

ED McKENZIE, 90, (2-5-01) radio personality. McKenzie was Detroit's leading disc jockey from the mid-1940s to the early 19605. His influential show aired on WJBK(AM) from 1946 until 1952 and then on WXYZ(AM) until 1959. Known as "Jack the Bellboy" he was one of the first disc jockeys to play records by African-American performers. McKenzie was also involved in the early days of television, hosting *Saturday Party* (1954 to 1958) and later *After Hours* on WXYZ(TV).

GEORGE MONTGOMERY, 84, (12-12-00) actor. Montgomery's 40 year film career began in rough-riding cowboy films and later included romantic leading roles in musicals and musical comedies. Some of his film credits include *The Cisco Kid and The Lady* (1940), *Riders of the Purple Sage* (1941), *Orchestra Wives* (1942), *Three Little Girls in Blue* (1946) and *The Brasher Doubloon* (1947). On television, Montgomery

was the Host/Executive Producer of *Robert Montgomery Presents* on NBC (1950-1957), which won an Emmy Award in 1952, was the Producer of *Eye Witness* on NBC (1953) and starred and narrated on NBC's *Cimarron City* (1958- 1960). His radio credits during the 1940s include *The Doctor Fights* (CBS), *Suspense* (CBS) and *This is War!* (heard on all four networks).

TIM O'DONNELL, 57, (12-13-00) newscaster. O'Donnell joined the ABC Radio Network in 1968 and covered major news stories including the assassination of Robert F. Kennedy and the recent presidential election. He was also the primary anchor for their magazine program, *Perspectives*, which is broadcast weekly. O'Donnell began his career as a reporter and newscaster for several New York City stations, including WOTT(FM).

JASON ROBARDS, JR., 78, (12-26-00) actor. The noted stage actor also appeared in films and on television during a career that spanned fifty years. Robards performed in stock and local theaters until he achieved fame in *The Iceman Cometh* (1956). He was nominated for eight Tony Awards, four of them for Eugene O'Neill works: *Long Day's Journey, Disenchanted, Toys in the Attic* (1960), *After the Fall* (1964), *Hughie* (1965), *The Country Girl* (1972), *A Moon for the Misbegotten* (1974) and *A Touch of the Poet* (1978). Robards appeared in over 50 films beginning with *The Journey* in 1959 and ending with *Magnolia* in 1999. Robards won back-to-back Oscar Awards in 1976 and 1977 for his roles in *All the President's Men* and *Julia*. He made many guest appearances on TV including *Bob Hope Presents the Chrysler Theatre* (NBC), *Sunday Showcase* (NBC), *Treasury Men in Action* and *The Philco Television Playhouse* (NBC).

RAY WALSTON, 86, (1-1-01) actor. Walston, who appeared on Broadway and in films, is perhaps best-known for his portrayal of Uncle Martin on the CBS television series *My Favorite Martian* (1963-1966). Some of his other TV credits include *Silver Spoons* (NBC 1982-1986), *Picket Fences* (CBS 1992-1996), which earned him Emmy Awards in 1995 and 1996, and *Touched by an Angel* (ABC 2000). Walston's stage credits include *South Pacific* (1950) and *Damn Yankees* (1955), which earned him a Tony Award. He made his film debut in 1957 with Cary Grant and Jayne Mansfield in *Kiss Them for Me*. Other film credits include *Paint Your Wagon* (1969), *The Sting* (1973), *Popeye* (1980), *Of Mice and Men* (1992) and *My Favorite Martian* (1999).

DICK WHITTINGHILL, 87, (1-24-01) radio personality. Whittinghill was the most popular morning disc jockey on Los Angeles' KMPC(AM) from 1950 to 1979. He began his radio career in Helena, Montana, and during World War II was a disc jockey for the Armed Forces Radio Network in Japan. Whittinghill joined KMPC in 1950 where he was known for his wit and outspoken views. He retired from KMPC in 1979 and joined KPRZ(AM), later KIIS(FM), for an afternoon show in the early 1980s. Earlier in his career he sang with the original *Pied Pipers*, a group that toured and recorded with Tommy Dorsey's band.

Information for this column was obtained from *The Big Bands* (4th ed.), *Broadcasting and Cable*, *The Complete Directory to Prime Time Network TV Shows 1946-present* (4th ed.), *The Encyclopedia of Jazz* (lst ed.), *The Hartford Courant*, *On the Air: The Encyclopedia of Old-Time Radio*, *QCWA Journal*, *QST*, *The New York Times* and *Variety*.

Thanks to Dr. John M. Anderson, Frank Q. Newton, Jr., W6SYG; Bill Timoszyk, and Dr. A. David Wunsch for additional source material.

VACUUM TUBE, *continued from page 50*

so-miniature format with nine pins would be helpful for, say, dual triodes with separate cathode leads and for expanded power tubes.

Thus the seven- and nine-pin button-stem formats were born. They slowly displaced the octal styles, never quite replacing them. Late in tube history, they were joined by two *ten*-pin miniature formats: a European design, with the added pin in the same circle as the others (in the 6AB9, say), and Sylvania's, with the added pin placed in the center of the base (in the 6C9, for example). The Sylvania people also put a miniature nine-pin button base on a T9-size bulb, yielding the "9T9" format as seen in the 6EW7, etc.

REFERENCES

1. K. G. Bucklin, "Miniature Battery Tubes," *Electronics*, Nov. 1939, pp. 27-28.
2. "Application Note on the RCA Miniature Tube," AN-106, RCA Mfg. Co. Inc., June 1940.
3. "Application Note on A Miniature-Tube Hearing-Aid Amplifier for Use with An Air-Conduction Earpiece," AN-107, RCA Mfg. Co. Inc., June 1940.

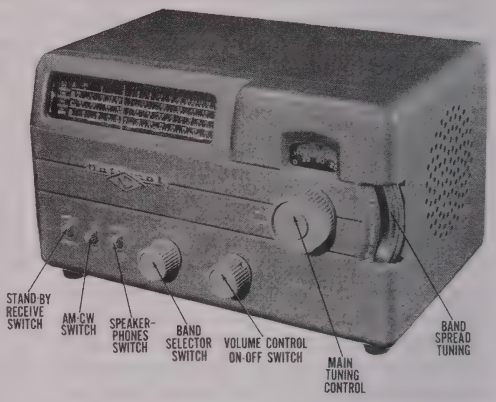
BY BILL FIZETTE, W2DGB

A Structured Approach to Fixing up Those Nice Old Radios

6—Repairing an AC-DC Radio...the National SW-54

Before you dive into the innards of that interesting set you recently acquired, pause a moment and decide just what you want to accomplish. And to do this you really should know something about the radio. How old is it? How rare is it? What kind of a basic circuit does it have? What is the general condition? How many repairs and possible alterations has it undergone before you found it? Are parts missing? Is the wiring diagram and other service information available?

Don't panic. If you don't know the answers to the above, ask someone. And if you get a vague answer to some specific question, ask someone else. Remember that collectors tend to specialize, and no one collector knows everything about everything. If it turns out that the set is rare and valuable, you might opt to clean it up, tag it, and put it on display. In the meantime, set up a folder and document your information.



The SW-54 (Courtesy Howard W. Sames & Co., Inc.)

This National SW-54 came my way as a repair job for an owner with some nostalgia for the particular set, with the specific instructions to make it work. A search of the literature revealed that it was built by the National Company in 1951, that it is described in Sams Photofact Folder #141, and that it is a pseudo-communications receiver with 4 bands. The cabinet design is quite fetching and is somewhat unique, and the radio is considered a collectible. However, it is neither rare nor particularly valuable.

All that aside, the set is really nothing more than a 5-tube AC-DC receiver with a more-or-less conventional and minimal circuit, dressed up with a bandswitch and some frequency coverage of the short-wave bands. When new, the set was a decent performer for casual listening. However, this one had been beat around somewhat and needed a fair amount of work.

The first job was to remove the chassis from the cabinet, which with this radio required some careful maneuvering. After blowing and brushing out the dirt, it was given a detailed inspection and notes made of work to be done.

The large bandspread dial was loose on the splined shaft, and the plastic was worn to the point that the only repair was to cement it in place. The dial cord was missing, and that was replaced. The cabinet and knobs were cleaned and set aside. One very important point to never forget with an AC-DC receiver; the chassis can be "hot" with 115 volts of AC, and you must be sure that there is a suitable protective back cover to keep prying hands safe. If the cover is missing, either make one from insulating material, or forget the whole job.

After verifying that the tubes were in the correct sockets and that the filaments were good (a simple continuity test with my VTVM), the line cord and the on-off switch were checked. Again,

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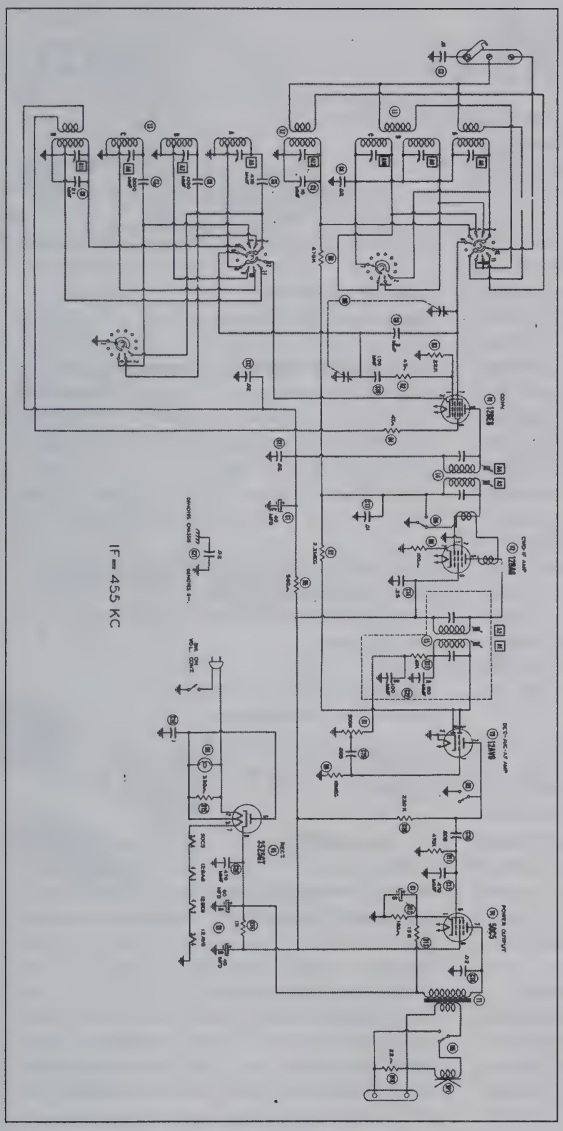

Schematic reveals that the SW-54 is simply a 5-tube AC-DC set with extra coils for the short-wave bands. (Courtesy Howard W. Sames & Co., Inc.)

a continuity test using the VTVM established that the resistance across the two prongs of the power plug was about correct for the series of tube filaments, meaning that the filaments should light up when the set was turned on.

This does not mean that the tubes were good, only that they should light up. When the tubes light and the rest of the repair work correctly, you should get some life, if nothing more than a local station or two. In this case the line cord and the plug did not need replacing...but if you happen to have cracked insulation or bare wire, replace the cord.

The four-section filter electrolytic, mounted in this case under the chassis, was too old to be of any use, so it was replaced with a fresh three-section standard unit for AC-DC radios obtained from Antique Electronic Supply. The fourth section was supplied with a small separate cartridge electrolytic. The values available, while not exactly the same as the original, were close enough to do the job.

The old paper by-pass capacitors were also replaced, and checks showed that they were indeed bad. Resistors were checked in place as described in an earlier column, and several were replaced. The volume control was cleaned with contact cleaner, and its action checked with the VTVM.

The reason: volume controls on older radios are often very noisy because of accumulated dirt. It is sometimes necessary to remove them from the chassis,take them apart, and clean with contact cleaner (I have also used WD-40 successfully). When the action is smooth, as demonstrated by the resistance scale on your VTVM, it can be reassembled and returned to the circuit.

The speaker output transformer windings were checked for continuity, the speaker itself was checked to see that it was live (use the VTVM resistance probes and listen for a click), a missing #47 pilot bulb was replaced, a tear in the speaker was repaired with rubber cement, and we were ready for the "smoke test."

This next point is very important. When working on AC-DC receivers, always use an isolation transformer! The chassis is open on the bench, and without one you have a 50% chance of plugging in so that the chassis is hot with 115 VAC. This simple precaution may save your life! This is a beginners' column, but unfortunately too many experienced restorers neglect this simple safety precaution.

(continued on page 57)

ON THE INTERNET

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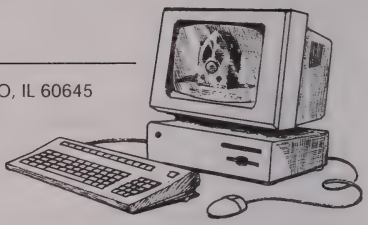
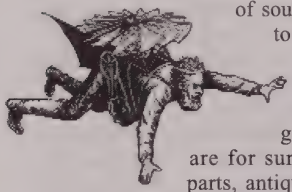


Parts on the Web

In the last couple of issues we discussed radio and tv equipment on the Web, so with this installment it seemed only natural to discuss the resources out there for fixing them — namely "parts." There is broad selection of sources when it comes to parts on the internet and I have not tried to organize them into categories. These links are for surplus jobbers, new parts, antique parts, and used. They range from retail to surplus to hobbyist sites. I have tried to list both familiar and lesser known sites as well as some of the better-known dealers and distributors. The listings are in no particular order.



Doing a simple search for "surplus parts" on any good search engine will bring up a very long list of sites to explore. You never know when one obscure source may have exactly that left-handed, bifurcated "widget" you need to restore that prize set that's been sitting on your bench! Like they say, "Parts is Parts."

Alltronics Electronic Component Supply
http://www.alltronics.com/
Selling and buying electronic components and equipment. There's a storefront for walk-in customers, but a large portion of business is mail order.

Play Things Of Past
http://www.oldradioparts.com/
Vintage Radios, Tubes, Parts, Books, Magazines

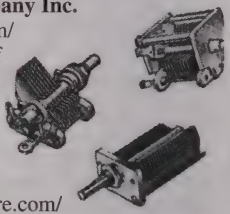
Mouser Electronics
http://www.mouser.com/
A distributor of electronic components. No minimum order!

A.G. Tannenbaum
http://www.agtannenbaum.com/
Service manuals; radio, tv, vcr, antique, amateur, audio, and test equipment, books, catalogs, and magazines.

Digi-Key Corporation
http://www.digikey.com/
One of the premiere mail-order and on-line parts suppliers...US and Canadian sites!

American Science & Surplus
http://www.sciplus.com/
A great site for surplus, off-beat and unusual parts.

Fair Radio Sales Company Inc.
http://www.fairradio.com/
Large cross-section of surplus parts in every category.



Antique Electronic Supply
http://www.tubesandmore.com/
Tubes, parts and more....their domain name says it all.

Herbach & Rademan
http://www.herbach.com/
Founded in 1934, H & R was a pioneer supplier in the radio parts field. Since then they have branched out into the electro-mechanical, scientific, security, and educational markets.

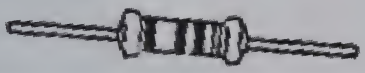
Radio Daze
http://www.radiodaze.com
Vintage radio & electronics. Sales, service, components, supplies.

Ocean State Electronics
http://www.oselectronics.com/
Amateur equipment, components, kits, tools, test equipment, antique radio, and much more.

Surplus Sales of Nebraska
http://www.surplussales.com/
Hard to find parts, searchable database.

Mendelson Electronics Company Inc. (MECI)
http://www.meci.com/
Mendelson's handles surplus & liquidation inventory.

Electronix Express, A Division of R.S.R. Electronics, Inc.
http://www.rsrelectronics.com/srp-indx.htm
Surplus electronics and closeouts—you name it.



Surplus Sales of Nebraska

Not Parts Sites, But Worth Checking out!

The Old Old Timers Club
http://users.ticnet.com/ootc/start.htm
The Old Old Timers Club was founded in 1947 by a group of amateurs who had played a part in laying the foundations of electronic communications. The requirement for membership was 2-way communication by wireless 40 or more years prior to 1947.

TMC (The Technical Materiel Corporation)
http://www.geocities.com/tmcvintage/index.html
Dedicated to the vintage communication equipment from Technical Materiel Corp. (TMC). Site has manuals, literature, photos, history and more.

A STRUCTURED APPROACH, *continued from page 55*

So, with the chassis plugged into an isolation transformer, and my VTVM DC probes connected across the main filter, I applied power to the system through a Variac, slowly bringing the voltage up and observing the B+ on the meter. It crawled up to 110 volts, about where it supposed to be according to the service sheet. If you don't have a Variac use a small light bulb (40 watts) in series with the primary. If it glows dimly you do not have a short in the system. If it is bright, unplug immediately and locate the problem.

Satisfying noises now emerged from the speaker, and I peaked the IF transformer adjustments on the noise. To do the job correctly, you should use a known 455 KHz signal from a calibrated signal generator (such as a BC221 or LM frequency meter), but if you don't have such, peak the IFs on noise, and the oscillator adjustments to known stations. This will usually work.

I was not satisfied with the set performance, so the two IF transformers were disconnected, removed from the chassis, and the internal construction checked. While the first one was good, the 2nd was not. An internal 47,000-ohm resistor was bad and was replaced, and two by-pass capacitors indicated on the diagram were simply missing. I installed them, although the manufacturer seemed to consider them unnecessary, even though they were on his diagram.

After reassembly, and an alignment following the instructions in the Sams sheet, the job was done. This general approach will work for just about any AC-DC receiver, and for most AC sets also. Remember to do neat, careful and methodical work, and you will probably succeed. However, be aware that there are all types of radios and that there are unique problems and solutions for certain receivers.

For many years the Rider's Manuals published hints for specific repairs on designated radios, and the manufacturers even got into the act by bringing out modifications to a particular model radio. Rider's is full of these. There are procedures for isolating problems, and as time goes on I will touch on these. But for now, a little AC-DC set is a good place to start.

MICS AND MEN

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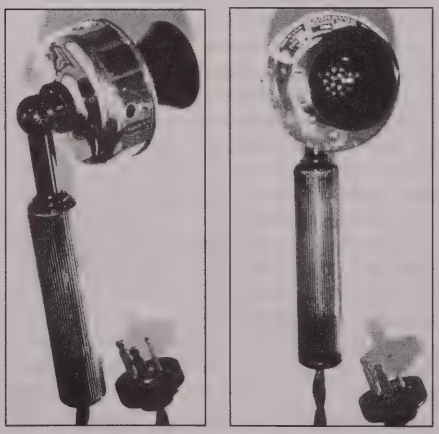
The Mic: Magnavox ST-4
The Man: Al Grebe, Sr.

As a microphone enthusiast I watch movies and TV, and read magazines, in a different way. At the sight of a microphone I'll forego interest in the medium's story line, and focus on the mic instead. I probably annoy loved ones and friends by loudly calling out microphone manufacturer and model number. I suppose I sound like the winner at a "Bingo" game.

Alfred Grebe, Sr. radiophoning from his roadster as shown in the Antique Radio Classified *January, 2001 article. This photo originally appeared in August 1919 issue of* Radio Amateur News.

If the scene gives us a glimpse of a mic and I can't immediately identify it, I blurt out things like, "What was that?! Show it again!" Sometimes this occurs when the show's dialogue is crucial to the plot. This is a test. Does my loved one really love me? Is my friend an understanding friend? (Am I over the edge?)

Early this year, a magazine article had me in such a state. As usual the time and place of the outburst was jarring and annoying to persons nearby. The subject of the outburst was the January, 2001 *Antique Radio Classified* cover story, by Dorothy Schecter, "Grebe Auto Radiophone—Cellphone of the 1920s." The story dealt with AWA First Vice President Ron Frisbee's creative re-enactment of a 1919 Hugo Gernsback *Radio Amateur News* cover story "The Auto Radio-Phone."



Two views of the Magnavox ST-4.

The original story showed radio manufacturer Alfred Grebe "radiophoning" while behind the wheel of an open roadster. Substituting for Mr. Grebe in the re-enactment was Ron's friend Alfred Grebe, Jr! Substituting for what appears to be a 1919 Buick and Grebe CR-6 in the original 1919 cover story were Ron Frisbee's 1928 Model A Ford Roadster and Grebe CR-14. The mic used in the re-enactment, a Frost Radio No. 155 hand microphone, may or may not be the same model used by Grebe Sr. in 1919. It was originally priced at $6.00.

According to microphone expert Bob Paquette, the mic seen in the 1919 photo could have been one of as many as six different models. Among them Ron's Frost, G.E.'s high power telephone transmitter, 4 unit type, and the Magnavox ST-4 shown in this article. All are from the 1919 era.

The ST-4 cost $20.00 originally. It was sold separately and also as part of two different public address systems, the $355.00 Type AC-2 and the $455.00 Type AC-3. One of these models may have been used by president Woodrow Wilson to address 50,000 people in a San Diego stadium in 1919.[1] The black-painted metal label on the face of the ST-4 says "Made in USA MAGNAVOX company Oakland, California."

Magnavox was formed in 1917. Two of the founders, Peter L. Jensen and F.S. Pridham, invented the voice coil, horn-type speaker in 1915.[2] If any readers can identify the mic used in 1919 please contact me so we can nail this question down, reduce further outbursts, and promote harmony among family and friends.

REFERENCES

[1,2] Paquette, R., *The History and Evolution of The Microphone,* self-published, Milwaukee, WI, 2000, pg. 130.

About Our **Feature Article Authors**

WILLIAM B. FIZETTE
A Structured Approach to Fixing Up Those Nice Old Radios.

Bill is AWA's current president as well as Editor of *The OTB's* "The Communications Receiver" Column. His bio appears in the February, 2000 issue.

DR. HUGO HOLDEN, BHB, MBChB, FRACO
Grid Leak Detection in the 1920s—Part 2

Hugo is a New Zealand trained Doctor and Ophthalmologist, currently practicing his specialty on the sunshine coast in sunny Queensland, Australia. He started out in electronics engineering, and often visited the late John Stokes' radio shop as a boy. It was close to the home where he grew up in New Zealand. Dr Holden changed to medicine in the early 1980s. Keen on vintage electronics, he has collected a number of interesting items, ranging from pre-war television sets, to germanium transistor communications receivers of the 1960s along with some early TTL equipment from the 1970s.

RICHARD A. PARKS
Firing Up a Western Electric 34-A

Born in 1936, Dick was brought up in Springfield, MA, where his dad worked in the Westinghouse plant that had manufactured the RADA sets. The factory junkyards provided him with ample stocks of rejected chassis ripe for parts-picking. After serving in the Navy (1953-1957), he entered University of Maryland and received his BSEE in 1961. Beginning in 1967, he made a career move that led him to become an expert in the identification of aircraft using computerized radar signal processing (an extension of the old military IFF techniques).

In 1981 he became a consultant in this field, working mostly for the Navy and traveling worldwide for data collection and development testing. With the end of the cold war, Dick now finds himself semi-retired, which makes it possible for The OTB to draw on his varied talents. In addition to this current article, he is Editor of *The OTB's* "Breadboarding" column.

On the personal side, he tells us that he's married and has five grown kids. He plays jazz in four or five bands, doubling on trumpet, trombone, banjo and sometimes bass.

JOE STEPHANY, N2XS
Putting the Navy OS-8 to Work

Joe is a retired Physicist. He joined the Navy after high school and attended college afterwards, earning an MS degree. He then worked in the research departments of Kodak, Stromberg Carlson, General Dynamics, Xerox, and Clevite (the former Brush Development Labs) where he had 24 major publications in leading physics journals and was issued 27 U. S. Patents.

Joe has held the calls KH6BDU and K2KSJ, and is now N2XS. He also holds a commercial Radiotelephone and Radar license. Since his retirement, he continues his explorations into fluctuation phenomena in semiconductors and these results have appeared in *The Journal of Physics*, *The Journal of Applied Physics*, *The Bulletin of the American Physical Society*, and *The Physical Review*.

He also is a reviewer for *The Physical Review*, the Physical Review Letters, and *The European Physics Journal*. This is the third time he has written for *The OTB*. Articles by his son Nolan, N2EAW, who is Assistant Chief Engineer at WXXI-TV in Rochester, have also appeared in *The OTB*.

New Books and Literature

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PLEASE INCLUDE SASE FOR REPLY.

Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

With this issue of "New Books and Literature," Bill Denk retires as book reviewer. He took over the job, beginning with the February, 1994 issue, at the request of OTB *Founding Editor Bruce Kelley, who had been the previous reviewer. Bill has been turning in a regular column ever since. But now, having reached the ripe old age of 90, he has asked to be relieved. The following two reviews are his last ones. Thanks so much for your fine contributions to this publication, Bill!*

Triodes in Radar: The Early VHF Era

Produced by The Tube Collectors Association (Special Publication No.2), P.O. Box 1181. Medford, OR 97501. 5 ½ by 8 ½ inches, soft cover, $18.00 (includes all six year-2000 issues of Tube Collector, the Association's newsletter. $18.00 postpaid.)

Based on a once-secret Signal Corps publication, this booklet neatly summarizes the development of radar as it existed in the WW2 period. Ludwell Sibley, Editor of *Tube Collector,* tells us that the "original xerocopy" of the publication is believed to have come from radar-history enthusiast, Don Helgeson, and was furnished by Bro. Pat Dowd, W2GK. It deals with the history of radar, beginning with the early work of the British and our Signal Corps 'in the 1930s, when the frequencies employed were mostly in the 100-200 Mhz region. Displays were on 3- or 5-inch round C.R. tubes.

Interestingly, early work on the detection of remote military targets was by thermal means. However, in the 1930s, radio pulse echo systems were investigated which required the development of highly directional antenna systems, and receivers with such low periods of recovery as to minimize the blocking effects of the high power transmitted pulses.

Although the emphasis of the work is on tubes, the systems aspect is by no means ignored. The evolution of radar from its beginnings through the second World War is reviewed. Tubes covered include triodes, tetrodes, the "lighthouse" tube, magnetrons and klystrons.

The development of radar began when it was observed that when aircraft passed between a transmitter and a remote receiver it caused a flutter of the signal at the receiver. This led to the pulse-echo system, in which short duration pulses were radiated by a transmitter sufficiently spaced to permit the pulse to reach its target, be reflected therefrom, and return to its source.

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DeForest—Father Of The Electronic Revolution

Copyright 1995, 2000, by Maurice H. Zouary, 56 Marlborough Road, Brooklyn, NY 11226. 8½ by 11 inches, soft cover, 274 pages. For info, tel. (718)284-5670.

Fans of DeForest will like this book. Regrettably, this important inventor and radio pioneer has many detractors; one of those once remarked that DeForest should be honored for two things; first, he invented the triode; second, he left its development to others.

The book's subtitle, "The Tube That Changed the World—How The Vast New Electronics Industry Came to be Born" reveals that the author is not one of the detractors. This reviewer found the book most informative and readable. A nicely illustrated chapter deals with DeForest's early years and family background. Though born in Iowa, he grew up in Alabama, the son of the President of a small college.

Though his father sought to induce Lee to follow in his footsteps to a career in the clergy, Lee's interests, from the beginning were firmly fixed on science, and he dreamed of being an inventor. His studies at Yale introduced him to the works of Faraday, Maxwell, Hertz and Tesla. His doctor's thesis, "The Reflection of Short Hertzian Waves from the Ends of Parallel Wires" won him his Ph.D. in June 1899 at the age of twenty six.

DeForest's first post-college job was with Western Electric Co. in Chicago at $8.00 per week. He subsequently went into business for

himself, but unscrupulous partners traded on his growing fame to enrich themselves.

Although DeForest is remembered primarily for his invention of the triode, he has other accomplishments to his credit, including the "sound-on-film" process which eliminated the synchronization problems associated with recording film sound on a separate phonograph record.

In a concluding chapter, "DeForest: The Magnificent Failure?," the author states "In terms of business affairs, no question, DeForest would be considered an abysmal failure. But can we measure the failures of this man in terms of wealth accumulated, or should we not measure him in terms of his accomplished service to humanity?"

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The reviews that follow introduce the work of David Kraueter, who has agreed to take the reins from Bill Denk. You'll find a short biography on Dave in the "About Our Authors" section in the previous issue of The OTB. *But it should be mentioned here that he has served as Editor and book reviewer for the* Pittsburgh Oscillator *of the Pittsburgh Antique Radio Society and is Interim Head Librarian for the U. Grant Miller Library of Washington and Lee University (Washington, PA).*

Old Timer's Bulletin, Compact Disc Edition

Order from CD Offer, AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468. Disc one: Vols. 1-25, 1960-1985; Disc two: Vols. 26-37, 1985-1996. Checks or money orders payable to "AWA Museum." See price information below.

Computer system requirements are: 486 or Pentium processor, Microsoft Windows 95 or 98, or Windows NT 4.0 with Service Pack 3 or later, 8MB of RAM on Windows 95 and Windows 98 (16MB recommended), and 10MB of available hard disk space. Your computer must also have Acrobat 4 on it. Don't worry if you don't have that—each disk comes with a free copy. (Mac users must visit www.adobe.com to download a suitable version). The discs are easy to load and use, for those of us willing to read instructions.

Among the first images you will see on each disc are a machine searchable index and a coded table of issue numbers which links to individual issues. I clicked on 011 (for volume one, number one) and up popped the first page of the first issue of volume one, containing Bruce Kelley's clarion call for wireless history enthusiasts to unite, complete with caps key stuck 'on', evidently intentionally. WELL FELLOWS, THERE APPEARS TO BE ENOUGH INTEREST TO TYPE THIS SHEET—SO HERE GOES. (What we would today call sexism was quite acceptable in 1960.) Thus was launched the special-interest magazine that today has a readership of 4,000.

Scroll down to page two, if you like. In fact, if you want to, navigate all the way down to page 64 of the fourth issue of volume 37. Page after page of clear readable text and graphics—dozens of issues, thousands of pages, countless topics.

It's fun to see how quickly improvements were made on an issue-by-issue basis (this phenomenon is characteristic of grass roots magazine start-ups). By issue number two the caps key had been unstuck. By issue number 4 *The OTB* was ready for its first photographs, and these remind us of the great advantage of the Portable Document File (PDF) format used in the production of these compact discs. It permits the reproduction of all types of material, including text in various fonts and typefaces, photographs, line drawings, etc.-literally a picture of each page being reproduced. It's nice to see some features that remain constant-the antenna towers and wires at the top of the first issue are pretty much the same as those reproduced in the issue you are holding now.

Too bad that the covers that were originally in color were reproduced on disc in black and white, presumably to save disc space. (In my opinion the November 1993 front cover, in color or monochrome, rates as a classic.) Another disappointment to some will be the lack of search capability at the word level. Although Ludwell Sibley's detailed index is keyword searchable, the *OTB* text itself is not. As Marc Ellis, who produced both discs says, scanning and proofreading the entire text of the *OTB* in machine-readable format would have been "beyond the realm of practicality."

The discs are $49.95 each postpaid in U.S. or Canada, or $89.95 for the two-disc set. Too expensive? Suppose at your next flea market you have the most-unlikely experience of finding a complete paper set of OTBs from the first issue through volume 37—no missing or loose pages, no missing issues, no graffiti, dog-ears, coffee stains, or hand-written notes, no torn-out ads, etc. What would you be willing to pay for them?

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Restoring Baird's Image

By Donald F. McLean. (IEE History of Technology Series 27). Published 2000 by Institution of Electrical Engineers, Michael Faraday House, Six Hills Way, Stevenage, Herts. SG1 2AY, UK. Email jsears@iee.org.uk. 6¼ by 9½ inches, 295

pages, hardcover. $55.00.

In 1977 NASA launched two unmanned spacecraft, Voyager I and II. They spent the 70s and 80s exploring the outer planets and are now slowly (at about 35,000 mph) travelling out of the solar system. Though NASA and the Voyagers chat with each other regularly, it takes about half a day for the signals to travel in either direction. You can check up on the Voyagers' progress by visiting: http://vraptor.jpl.nasa.gov/voyager/voyager.html.

Peripatetic astronomer Carl Sagan convinced NASA late in the game to include aboard each spacecraft a gold-coated copper phonograph record. The records each contain 118 photographs of our planet and its inhabitants, greetings in about 60 languages (and one whale language) and about 90 minutes of "the world's greatest music", this last including Chuck Berry singing Johnny B. Goode.

Science assures us that someday the sun is going to burn out or explode. Either event will likely cause considerable discomfort to folks living here on earth. But not to worry—Beethoven's matchless Cavatina will continue hurtling blithely on through space to... where? Sagan estimated that in the cold vacuum of deep space the phonograph records should last for 'about' a billion years. Some "day" or some eon, somebody-or something-may discover one of the Voyager discs and learn how to play it, using the stylus and cartridge that NASA so thoughtfully provided.

If you just can't wait to see how the Voyager story ultimately plays out, you might want to consider the experience of Donald F. McLean, whose recent work decoding John L. Baird's 1920's video recordings has parallels in the long-playing Voyager saga. These parallels are obvious, and in fact McLean includes a few pages about the famous spacecraft near the end of his book. He concludes that whoever may find the Voyager phonograph records "will then have the task of restoring the age-old video, using techniques that may not be all that different to those used for Baird's Phonovision. The clever title of McLean's book permits two interpretations, literal and figurative. The literal work McLean did in "bringing back" and computer-enhancing television images from Baird's 1920's Phonovision records was outlined in McLean's article beginning on page 12 in the last *OTB*. If you liked the article, you're pretty much guaranteed to like his book, which elaborates in great detail (too much detail to be reviewed here) the technical side of recapturing the images.

But McLean also makes a strong case for restoring Baird's image and stature in television history. He rightly cautions us against thinking of Baird as having the "wrong" technology. To do so would be similar to thinking that Edison's cylinder phonograph was the wrong technology in an age when Emile Berliner's flat discs had taken over. Baird didn't have the wrong technology; he had the technology of the 1920s and early 30s.

Also, though Baird may have started out using 'sealing wax and string' equipment, he continually upgraded and improved his apparatus. (It is not an easy thing to convince the British patent office to issue a patent; Baird had 175 of them). Baird personally demonstrated a mechanical color television system a few years before he died. A key component was a 12-inch diameter 20-facet mirror drum that rotated at 6,000 rpm, subjecting the mirrors to about 2,000 times the force of gravity. No sealing wax or string here.

We are in Carl Sagan's debt for producing the records on board the Voyagers and we are in Donald McLean's debt for decoding and enhancing the Baird Phonovision discs, thereby also restoring Baird's image today.

For the story of the Voyager records, see *Murmurs of Earth: The Voyager Interstellar Record* By Carl Sagan and others. Published 1978 by Random House. 8¼ by 9½ inches, 275 pages, hardcover. Out of print, available through http://www.bookfinder.com.

♦ ♦ ♦ ♦

Fireside Politics: Radio and Political Culture in the United States, 1920-1940

By Douglas B. Craig. Published by Johns Hopkins University Press, 2715 North Charles Street, Baltimore, MD 21218-4363. 6¼ by 9¼ inches, 362 pages, hardcover. $45.00 postpaid. Available at: www.amazon.com.

This is no hobby book. It is an academic study, serious and unexciting in style but so richly detailed and analytical as to set a standard. The author, a senior lecturer in history at the Australian National University, knows his subject well; he previously wrote *After Wilson: The Struggle for the Democratic Party, 1920-1934.*

The book's broad subject is the influence of radio on politics—and politics on radio—during the interwar years. The thoroughness of the study is evident in a glance at its subheadings: *advertising, formation of networks, government regulation, the Federal Radio Commission, the Communications Act of 1934, the FCC, campaigns and political programming, audience measurement, voter behavior, etc.* A study of radio, citizenship and good taste forms a long coda to the work.

Strangely enough, television might get in the way of the full appreciation of this book. Young

readers may wonder what all the fuss was about, not realizing that radio was the only game in town during the 20s and 30s. With no competition from television, radio audiences were huge. In the twenty-year period covered by the book the percentage of American homes equipped with radio went from essentially zero to 80%. By contrast, during the same period homes equipped with telephones remained steady at about 40%.

Everyone listened to radio. I don't mean they had the radio 'on'; I mean they listened to it. Hence, radio could actually affect, say, the way people voted or what they bought-or thought. One of the social phenomena evident throughout the book is that of people struggling to understand, manipulate or exploit the new medium of radio, not always with the expected or hoped for results. For example, Craig takes four pages to describe the 1928 Hoover-Smith national contest— "the first true radio campaign"—then concludes with, "Amidst the general celebration of the newfound power of radio, nobody seemed to notice that the losing party had spent more on radio than the winner."

I'm glad this book is hardbound, for it will be used for many years in libraries and reference collections. Typeface, layout and physical organization are all in keeping with the scholarly nature of the book. (Kudos to the savvy designer who put a stylized radio dial at the head of each chapter). Other visual features include charts, maps, and reproductions of contemporary cartoons. Readers who saw the movie *A Face in the Crowd* can see it succinctly reprised in the cartoon on page 169.

Like any good scholar, Craig not only tells us what happened and why, but also where he got his information. So the book includes a twenty-page bibliography listing, among many other sources, about 50 archive collections. These, together with 43 pages of notes and a detailed index make Fireside Politics a virtual *vade mecum*.

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Marconi's Atlantic Leap

By Gordon Bussey. Marconi Communications (New Century Park, Coventry CV3 1HJ, England), 2000. 7 by 10 inches, 96 pages, hardcover. $10.95.

Do we need a whole book about sending the letter 'S' across the Atlantic Ocean? In this case it is justified for no other reason than the singularity of the event. In 1895 Marconi was sending radio waves over a distance of a few yards; on December 12, 1901 he sent them from Europe to America, thus proving that radio waves could follow the curvature of the earth.

One might think that Marconi's accomplishment would have been welcomed immediately by humanity, and he did receive recognition from nations worldwide. But on the very day he publicly announced his success he also received a letter from the Anglo-American Telegraph Company of Newfoundland informing him of their monopoly on telegraphic communication in that colony and calling upon him to discontinue his work and dismantle his station.

Marconi immediately suspended his experiments. Alexander Graham Bell would soon offer Marconi the use of his estate in Nova Scotia, where Anglo-American had no jurisdiction.

Bussey's book is greatly enhanced by the inclusion of 70 reproductions of photographs. About half these are contemporary pictures of the transmitting and receiving installations at various stages of completion. One could describe a rigger working at the top of a 200-foot aerial mast, but it is much more meaningful to actually picture him. Other photographs reproduce manuscript documents, printed records, maps, etc. The text and pictures of this little book combine nicely to give the reader a most rewarding "I was there" feeling.[1]

Some people will come to this book to determine what frequency Marconi used for his historic transmission. Bussey quotes Marconi as saying (in 1908) that it was about 366 metres (820 kHz), but Bussey reminds his readers that "no convenient method of measuring station wavelengths had been evolved at that time...."

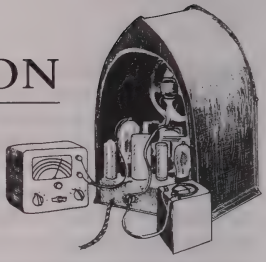
Twenty-first century readers may also have to be reminded of other facts about Marconi's achievement. For example, the famous 'S' went only one way across the Atlantic. Marconi had no high-power transmitter in Signal Hill, Newfoundland. Also, the receiving equipment at Signal Hill was passive; it had no ability to amplify. It could be thought of much as we think of a crystal set today, except in place of the crystal was a none-too-reliable coherer. Marconi increased the sensitivity of his receiver by burying metal plates in the earth for a ground, and using a large kite whose 500-foot tether acted as an antenna.

And here is a question that Bussey's book did not (and could not) answer: how did Marconi feel when he first heard those few faint signals from far across the sea?

[1]For more information on Marconi's transmitter, see Desmond Thackeray's article "First High-Power Transmitter at Poldhu," *AWA Review*, Volume 7, 1992, pp. 29-45.

EQUIPMENT RESTORATION

EDITED BY **KEN OWENS**, 478 SYCAMORE DR., CIRCLEVILLE, OH 43113
PLEASE SEND CORRESPONDENCE DIRECTLY TO THE ABOVE ADDRESS, INCLUDING SASE FOR REPLY.



Coast Guard Receiver Identified; 1L6 Substitution Tested

I want to acknowledge my debt to the late Ross Smith. When I began editing this column about 5 years ago, Ross immediately wrote me offering to help in every way. He put me on the mailing list for the Bulletin of the Northern Indiana Historical Radio Society with permission to use anything I wanted from it. I have used many of their items in this column. Ross and I corresponded frequently to exchange ideas, and we enjoyed getting together at the annual AWA conference. I shall miss him.

At the time of his death, Ross was restoring a 6V Philco farm set and converting it to AC operation. We had planned a column documenting his work and discussing the restoration and conversion of farm sets in general. I deeply regret that our plans could not be completed, but if one of our readers has done a farm set and wants to take up this project, write to me.

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One of our sharp-eyed readers who wishes to remain anonymous points out an error in the last episode of this column (Feb '01). Your editor noted that types 78/79 tubes could replace types 6C6/6D6. This should have read 77/78.

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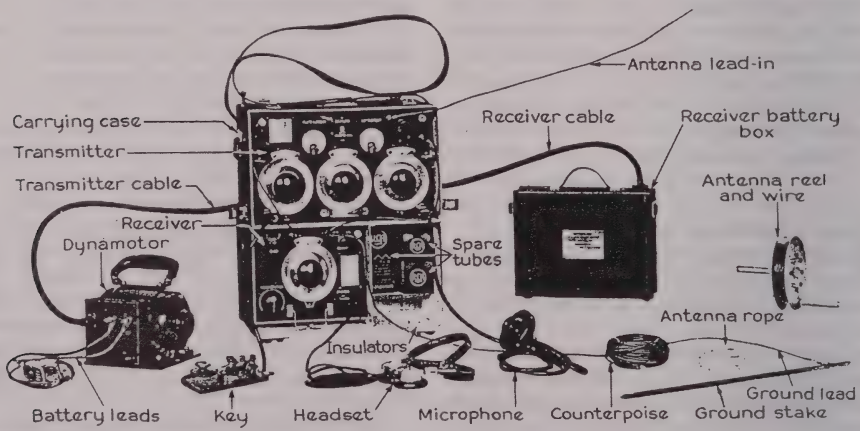
Alton DuBois (Queensbury, NY) acquired a transmitter and receiver which he could not identify. He made an inquiry in the Feb 2000 OTB *with a photo of the set, but got no help. He finally was successful, but let Alton tell the story.*

Last summer I acquired a Coast Guard transmitter and separate receiver. All the label plates had been removed. The only identification was the Coast Guard symbol and some numbers inside the front panel. I contacted the Coast Guard Museum, several other military museums, and the Signal Corps.

I then received information from a person in Maine who had a transmitter like mine. He sent information that this outfit was made by General Electric. He enclosed a picture (shown below) of the units with their carrying chest, battery box and motor-generator for the transmitter, but he had no schematics. The picture identified the



Alton DuBois' persistence finally drew a response from a reader who sent this 1932-era drawing identifying the mysterious Coast Guard transmitter/receiver set as a T-22 and CGR-22.

transmitter as Coast Guard Model T-22 and the receiver as Model CGR-22 dated 7/14/32.

I then wrote John Anderson, curator of the GE Hall of History in Schenectady NY. This museum has a large collection of documents about GE and RCA, but they had nothing on my set.

So I did it the hard way—I traced out the circuits. The wiring was black, cloth-covered rubber laced in bundles. I had to cut the lacing so I could wiggle the wires and trace them since they all looked alike.

The transmitter is a MOPA using 4-112As heated by a 6V battery. Plate power is from a motor-generator. I will cover it in a future article. The receiver is a 3-tube regenerative using 2V "Air Cell" tubes heated by a 6V battery. Plate power is also from batteries.

The circuit of the receiver is shown here. It is a simple regenerative circuit. An untuned type 32 tetrode RF stage is followed by a type 32 tetrode regenerative detector impedance coupled to a triode headphone amplifier stage. Regeneration is controlled by varying the screen voltage. Being untuned, the RF stage contributes no amplification, but only serves to isolate the detector from the antenna to keep oscillations from being radiated and to prevent the antenna from affecting the detector tuning.

There is only one tuned circuit, consisting of L1 and tickler, L2. C1 is the main tuning capacitor and C2 is a trimmer. Two switch-selected bands are provided. Frequency range is not marked, however, the transmitter has a frequency vs. dial setting chart for the master oscillator. Marked frequencies are 2464, 2652, 2670, 2692, 2740, 3000, 3500, 4000 and 4050 kHz. When I fired up the receiver, I got a few weak stations, but there is not much on these frequencies today.

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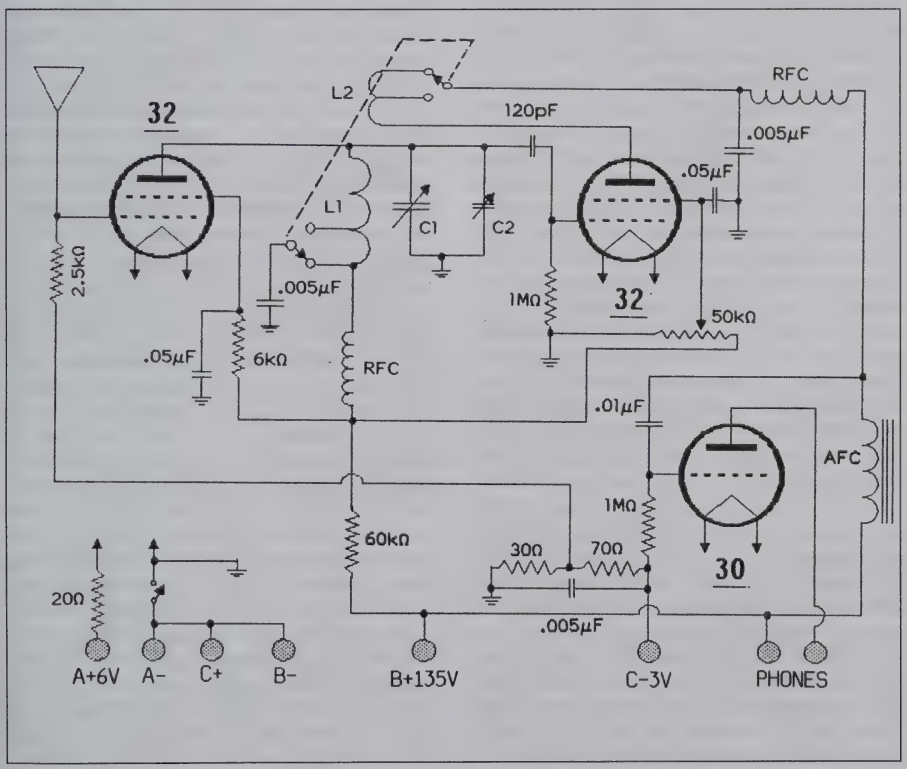
Antique Radio Classified *(V. 14, #1, Jan., 1997) carried an article suggesting that a modified 1R5 tube could replace the scarce and expensive 1L6 used in the G500, H500 and 600 series Zenith Transoceanics. John Kaetz (Besse-*

(continued on page 70)



Since no schematic was available, Dubois decided to trace out the CGR-22 circuit so he could fire up the set for testing.

BY DR. HUGO HOLDEN

GRID LEAK DETECTION IN THE 1920s—*Part 2 (conclusion)*

Part 1 of this article appeared in our November, 2000 issue.

Three Ways to Find the Answer

1) Fig. 15 shows a hypothetical wave of audio modulation of an RF carrier, rising 31.5% above its resting level R (no modulation) to Vp and falling 31.5% below resting level. Therefore the RF carrier on its positive half cycles troughs down to 37% of Vp on account of the modulation. This value has been chosen deliberately to simplify calculations. If we look at the exponential decay of the voltage on an RC network starting from point Vp, so that it falls fast enough so it is below or equal to the trough in the modulation half a cycle later (see Fig. 16), the values are easily calculated. This is because the time taken for an exponential to decay to 37% of its starting value is the "time constant" equal to R times C. So we can conclude that, provided the RC value is equal or less than half the period of the wave, T/2, or put another way 0.5 divided by the frequency, f, then negative peak clipping will not occur. This relation is then, f=0.5/(RC) where f is the maximum allowable modulating frequency. This is a very good approximation, but not entirely accurate as it slightly overestimates the allowable frequency. As can be seen, the exponential is not quite rapid enough to track the faster falling part of the modulating wave.

2) Fig. 17 shows a better way, a cosine wave of modulation, rising and falling one volt above and below its resting value, which is 2 volts above zero. This could be described as 50% modulation. The rate of change with time of this modulating wave at its most rapid part, one quarter of its way into the cycle, an angle of pi/2 radians, can easily be found by taking the derivative of the cosine function and finding the value at that point. The functions and their derivatives are in the table, Fig. 18. Likewise if we consider an exponential starting to fall from the same point (quarter of the way into the modulating cycle) from its timing t = 0, toward zero, which is two volts away, we have the exponential function shown as the dotted line in Fig. 17. We can easily calculate the rate of change of this function by the derivative, see the table of Fig. 18 again, and determine the value at t=0 for this exponential. See Fig. 19 where these two rates of change are calculated. If we make them equal, then the exponential decay of the grid leak capacitor charge via the grid leak resistor is just "fast" enough to track the modulation. This is done in Fig. 20, and the value we get is f= 0.32/(RC).

3) A third way to calculate this is from information provided by Terman about AM detection, p. 555. Provided that the AC impedance (to modulating frequencies) divided by the DC impedance of the detector load is greater or equal to the modulation, m, and that this rule is not violated, then distortion (some form of negative peak clipping) is avoided. "m" is defined as the crest of the modulating wave rising above the no modulation level, divided by the no modulation RF level. For the wave illustrated in Fig. 17 then m = ½ or 0.5. This gives an even more conservative result. It can be calculated from RX/(R[square root of(X squared plus R squared)]) equals m. This is the ac impedance of R and C in parallel, divided by the DC impedance R, where X is the reactance of C. If we make this equal to 0.5 (50% modulation), I calculate the formula to be f= 0.275/(RC). This clearly ensures that the time constant is fast (short) enough to track the modulation without ever ending up with the situation illustrated in Fig. 14. It is interesting that for m=1 or 100% modulation, the equation can't be solved for a value of R, which would have to be zero to satisfy the conditions. This means that with these

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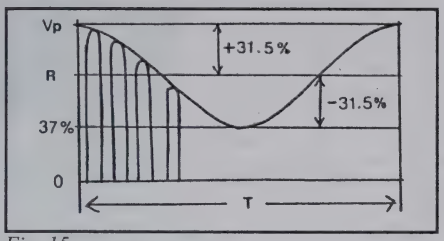

Fig. 15.

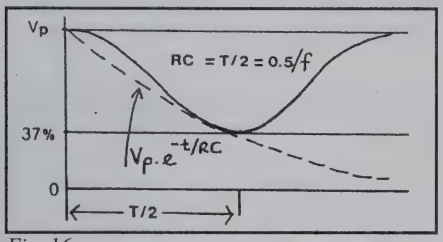

Fig. 16.

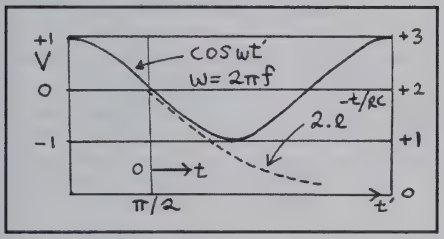

Fig. 17.

FUNCTION	DERIVATIVE
$\cos wt'$	$-w \sin wt'$
$2.e^{-t/RC}$	$\frac{-2}{RC} \cdot e^{-t/RC}$

Fig. 18.

When $wt' = \pi/2$, then
$-w \sin wt' = -w$
$= -2\pi f$

At angle $\pi/2$, $t = 0$
for the exponential:
$\frac{-2}{RC} \cdot e^{-t/RC} = -2/RC$

Fig. 19.

diode and "RC" styles of detector, that 100% modulated waves, with practical values of R and C, will suffer from some distortion. This is because the RC discharge cannot be made to fall to zero in a sensible time period, as it is an exponential. Modern precision detector techniques get around this problem.

The practical reality of a directly heated tube diode (or triode used as a diode) throws in some interesting features. We can model this as a group of diodes (or grid/cathodes of triodes) and a voltage divider representing the tube's heater element. The heater element (filament) has a voltage distribution. See Fig. 21. When the RF circuit (and grid DC return) is to the positive side of the heater, then diode Dl has no forward bias, D2 a little and D5 has a good forward bias equal to the heater voltage. Forward bias is helpful. "The higher the plate potential, the less is the tendency for electrons to remain in the space charge region (near the "cathode") and repel other electrons." (RCA tube manual, section on diodes). Forward bias assists diode (detector) conduction and function at low RF signal levels. Good detector diodes like the 6AL5 have closely spaced electrodes that minimize the space charge, and rarely need a forward bias. Widely spaced elements such as the grid/filament of a 20lA are not as good. Those of us who have tried to use a tube diode in a crystal set in the past know that they don't operate well without some forward bias because the signal level in this application is too low. Possibly though, this "more sensitive configuration" would be prone to overloading with stronger signals.

On the other hand, if the return is to the negative heater, then the imaginary diode elements D2 to D4 have increasing reverse bias. So this arrangement would probably handle higher input RF levels without overloading, but be less sensitive to weaker signals. The results (D.K. Owens' article in the Feb., 2000 *OTB*) with the grid return to negative filament are poor with the 20lA.

Weak Signals

It is still possible for the 20lA tube detector stage to detect/demodulate AM even with a poor rectification effect at the grid. As long as there is some asymmetry produced by "diode" type conduction, then audio will be retrieved when the RF is filtered off the plate circuit. Anode bend detectors preferentially amplify the positive half of the carrier by being deliberately biased to produce this effect, while an efficient grid leak detector amplifies what amounts to a

"voltage doubled" negative half of the carrier. The curved grid voltage versus anode current relationship of the triode can favor "anode bend," however in the boundary between "grid leak"' and "anode bend"' processes, no demodulation can occur.

We can now incorporate a model of a directly heated triode, like a 201A. This could be composed of multiple indirectly heated tubes with their cathodes distributed along a heater chain. Three tubes are shown for convenience (Fig. 22). However we could imagine larger numbers. It now becomes clear that the choice of the grid leak return has two fundamental effects. Firstly it configures the grid/cathode or "diode" component of our triode for generalized forward or reverse bias, and secondly it changes the triode's operating point via the average grid bias. This shifts the transfer function of the tube (change in grid voltage vs change in anode current) to a different part of the triode's curve. The placement of the ground, or "earth connection" either to plus or minus filament, is academic, as the anode current, Ia, is very small with respect to the low resistance of the heater element in the tube. So you can ground either the plus or minus side of the heater in this example with no other effect.

Summary

Let's look at some values of R and C in AM detectors. Values typical in the post war period (*RCA Handbook*) are typically a C of 100pF and an R of 250K. Using my second formula you get f=12800, or 12.8kHz, which is the upper audio frequency you could demodulate without distortion when the modulation is no greater than 0.5. An even shorter time constant is required if the modulation is deeper. This seems sensible, and you'd get pretty good fidelity out of an AM detector for typical voices and music. But what about a grid leak of 3meg and a 100pF capacitor in a 1920s radio? This gives about 1 kHz being the upper frequency you can demodulate without distortion. Combinations such as 3 meg with 250pF are obviously poor. I suspect that with a good grid leak of 1 meg, and a 100pF capacitor, then "f max" without distortion = 3.2 kHz. This is acceptable for a horn speaker with a metal diaphragm. It explains why there is a noticeable performance change with different grid leaks, and why users must have liked to try different values. After all many sets did not have tone controls.

Lower values of leak load the resonant circuit driving the detector and lower the gain by:

(Continued on page 70)

$$-2\pi f = -2/RC$$
$$f = 1/\pi . R.C$$
$$f = 0.32/RC$$

vs

$$f = 0.5/RC$$

Fig. 20.

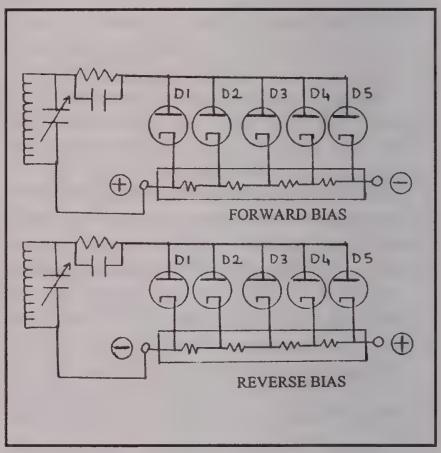

Fig. 21.

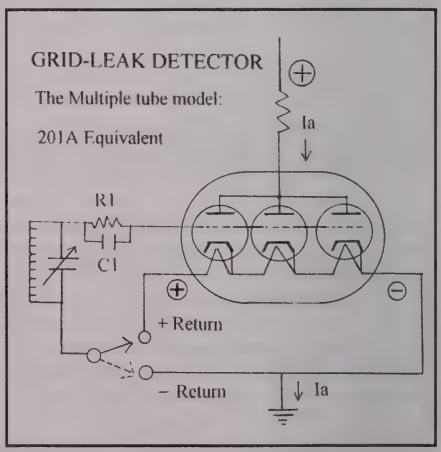

Fig. 22.

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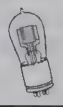

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EQUIPMENT RESTORATION, *continued from page 65*

mer AL) has tried the substitution and offers these comments:

Substituting a 1R5 for a 1L6 in the H500 Transoceanic results in a serious frequency shift. The reception is shifted completely off the dial on the 16, 19, 25 and 31 meter bands. The shift was about 1.7 MHz on the 16 meter band and proportionally less on the longer wavelengths. The shift was about 50 kHz at the high end of the broadcast band.

I also tried a 1LA6 loktal tube in an adaptor and found that the shift was ½ to ⅔ of the shift with a 1R5. [*It appears that any substitute for the original 1L6 will require complete realignment if the calibration is to be preserved. Ed.*]

♦ ♦ ♦ ♦

Judging from correspondence, there is renewed interest in replacing resistor line cords since good ones are almost unobtainable. I will probably devote an entire column to this subject in the near future, so if you readers have any contributions or thoughts on the subject, send them along to me for inclusion.

GRID LEAK DETECTION, *continued from page 68*

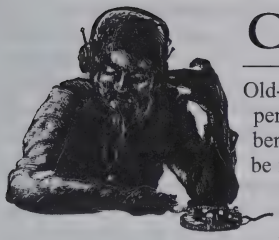
1) resonant circuit loading, 2) dropping detector efficiency, and 3) broadening the bandwidth, however the treble response is much better. Higher values produce more overall volume but a drop in the amplitude and quality of the higher audio frequencies, "treble cut," as demonstrated even above 1 kHz for common values. In these early times I suspect that people had more of a quest for gain than fidelity. The horn speakers were not up to good high frequency responses, but cone speaker technology was improving, and clearly the detector time constants became shorter as fidelity became an issue. I can clearly hear the difference in the tone of the sound when I substitute a 5 meg leak for a 1 meg in my Grebe radio driving an Amplion AR111 horn speaker.

From the point of view of detector tube bias conditions, the tube's grid current is so small that leaks ranging from 1 to 10 meg have little effect on the detector tube's bias conditions.

REFERENCES

Terman, *Radio Engineer's Handbook*, First Edition, Sixth Impression, McGraw-Hill, NY, 1943.

RCA receiving tube manual, (post war copy).



CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551**.

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OTB classified ads are now available for browsing in the "*OTB On Line Edition*" on our internet web site (www.antiquewireless.org). This practice will give members dramatically increased exposure for their ads.

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R32 Victor Talking Machine Micro Synchronous Tuning chassis 245 amplifier and power supply and speaker. Very clean and working well, $40., you pay shipping. Also have H-P Model 608D VHF signal generator - 10 to 420 mHz, works but not well, with manual. Many tubes, 6080, 5675 etc. with 21 in all. Heavy power transformer, 2 meters and many other parts. Circa 1965, $35. 62 lbs., you ship. John T. Kaetz, 6841 Chesser Rd., Bessemer, AL 35023 (205) 491-2933

1939 Wilcox Gay Recordio A-93 chassis. Includes 10 tube AM/SW receiver, turntable, motor, microphone for recording, additional knobs, parts, service info & schematic, $35. Jim Ligouri, 7 Sycamore Court, Atkinson, NH 03811 (603) 362-5712 E-mail: Jjligouri@aol.com

Avantek Solid State Amplifier Model AWP-400T, 10-400 mHz, $10., plus shipping and handling. Leonard Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150

Parting out a Grundig Majestic Model 7000, which includes BSR Monarch UA8 four speed changer, knobs, tubes, chassis, dial glass and operating manual. What do you need? Charles Harper, 2000 Jackstown Road, Paris, KY 40361 (859) 484-9393 E-mail: charper@kyk.net

#80, $3., #27, $2., UX/UV99, $18.,many more old and NOS. Send for list. A-K Model 52 chassis, $30.; Philco Wiring Diagrams & Parts List 1928-1937, 142 pages; Philco essential service data on all models, 6 pages; Philco Radio Parts catalog, 32 pages, all three, $45. Andrew Toross, 425 Old Country Rd., Orange, CT 06477 (203) 795-4523

Philmore mounted crystal detector in original package, $10.; Grunow 5B table radio with chrome deco grille, $125.; three brass keys and 2 Western Union sounders, $100.; 1956 ARRL Handbook, $20.; Semaphore to Sattelite, $30.; Cavalcade of Broadcasting, $35.; Zenith 5L41 tube radio, $10.; Zenith Transoceanic Dial-O-Map, $20.; Copy of Pilot TV-37 owners manual, $5.; Zenith Royal 800 with plug-in transistors, $200.; Winston 2 transistor radio with whip antenna, $95.; Thomas Edison spark plug, $20.; Collection of 2" and 3" CRTs, 11 assorted for $75. Bill Rolf, 30131 Center Ridge, Westlake, OH 44145 (440) 871-4547

Philips Motional Feedback Stereo System. Consists of 2 enclosures, each having 3 speakers driven through bi-amplifiers that are electronically listening to the audio acoustic output and instantly correcting the speaker output to match the input signal. A piezo-electric transducer at the dome of the voice coil monitors acceleration to signal a comparator to change the waveform to distortion free at the speed of light. Absence of delay is because the pickup senses incorrect cone motion long before it reaches an audible level. So, the

sound heard by the listener is virtually the same as the original signal. This system can be hooked up to the radio receivers and amplifiers with 1.0 to 7.5 volts out. SASE to Francis Yonker, 1229 Inverary Place, State College, PA 16801 (814) 867-1400 E-mail: yonker1229@home.com

SELL/TRADE—LITERATURE

Free, to a good home, Sam's Photofact folders 1-1300 with a few missing in the first 100. You pay shipping, or come and get them in warm, sunny, central CA. Ron Zammit, 469 Campana, Arroyo Grande, CA 93420 (805) 489-5724

Radio schematics & service data, $2.50 plus #10 SASE covering U.S. receivers 1920s to 1970s; Canadian receivers 1920s to 1970s; Australian receivers 1930s to 1950s. Price is for 1 to 5 pages of data per model, over 5 pages the copy charge is 20 cents per page. For questions/quotes, SASE please. Want radio club publications, newsletters & journals. Steve Rosenfeld, P.O. Box 418, Manahawkin, NJ 08050 (609) 978-0331 E-mail: srosenfeld@ems,att.com

Back issues of the *OTB* for sale as a lot. Vol. 27 #2 (Aug. 1986) through Vol. 41 #4 (Nov. 2000) a total of 59 issues, with *OTB* Index for Vols. 18 - 29 and AWA Review Vol. I - III. $20. plus shipping/mailing weight of 11 lbs. Theodore Fishman, 9 Reunion Rd., Rye Brook, NY 10573-1084 (914) 937-0658

1928-43 European radio schematics, 6 volumes, more than 1300 pages, $85.; 1932-38 Telefunken radio service book with sketches of parts layouts for 43 models, 90 pages, $200. (all copies only), shipping extra. Argyrios L. Adamidis, Kampouridi 19, Panorama, Thessaloniki, Greece 55236 E-mail: aadam@acc.teithe.gr

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Firth Model 35A receiver; Westinghouse Type CAY-2601 Filament Ammeter (0-1.5A used in IP501 and SE 1030.) Also have been looking for a Connecticut Telephone and Electric Type J-113, 3 ohm rheostat, for over 2 years now! (Check your parts box, will pay $100. for one, and $150. for a complete one with knob and dial scale!). J. C. Woychowski, 119 Laurelwood Drive, Niantic, CT 06357 (860) 739-4673 or Fax (860) 739-4673

WWI crystal receiver Type BC-14A; Pilot Super Wasp shortwave receiver with coils. Gary Berg, 24 Pat Road, Newburgh, NY 12550-7218 (845) 565-5077 or e-mail: bergg@hvc.rr.com

WANTED—INFORMATION

Settings for Compactrons and Nuvistors for an adapter on Model 612 Precision tube tester. Alton A. DuBois, Jr., 67 Peggy Ann Rd., Queensbury, NY 12804 (518) 792-3130

Info on LF power line communication techniques for voice and data, 1930 to present. Frank J. Lotito, K3DZ, 1428 O'Block Rd., Pittsburgh, PA 15239 or e-mail K3DZ@aol.com

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Schematic and/or manual for Triumph RF generator, Model 130. Also data for "u-test-m" tube tester found in all stores during the 1960's. Leonard Aquilino, Jr., 7187 Lakeshore Rd., Cicero, NY 13039

Need schematic for 1976 Fender CBS four tube reverb unit. Lyle Wecker, 859 Chenango St., Binghamton, NY 13901 (607) 723 1601 evenings

Looking for hard-to-find circuit diagram for 3-tube Fada 195-A "Neutro-Junior". Can anyone help with info on Weston Model 590 Oscillator, or Solar "CC-2-U" RLC Component Tester? Would also appreciate help getting copies of anything on "Lifetime Microphones" (ca. 1932), and "PHILCOTRON B" wet cells. Bob Lindsay, 2398 Greenmeadows Way, Ashland, OR 97520 (541) 201-0005 E-mail: bobl@easywaresoftware.com

Original issue of Amateur Radio Callbook, circa 1935 thru 1970 listing Lloyd C. Greene, W1ACF —1st location Canton, MA—2nd location Rye, NH—will pay more for oldest issue as above. Lloyd C. Greene, Jr., 99 Mill Road, Chelmsford, MA 01824

Radio Amateur magazines from Canada, Australia and England for years of 1941 to 1948. Also *Electron*, *Radio News*, *Radio Craft* magazines from 1940 thru 1950. Alan Mark, P.O. Box 372, Pembroke, MA 02359

Need original copies of the following *OTB*s to complete my collection: Vol. 1, No. 4; Vol. 2, No. 1; Vol. 3, No. 2; Vol. 5, No. 2 and Vol. 6, No. 2. Also need Vol. 5, No. 3 of the ARCA Gazette. Will purchase or have many early *OTB*s to trade. William Ross, W9WR, 875 Gordon Terrace, Winnetka, IL 60093 (847) 441-6462 or E-mail: bross@interaccess.com

WANTED—MILITARY

Navy RU Receiver. Have extra coil sets for trade. Need schematic for Navy CG-46115 receiver. Also need QST for Sept. 1946, "73" for 1968 and want a 1960 CQ Surplus Schematic Handbook. Jerry Beaudin, Rt. 3, Box 2651, Mc Millan, MI 49853

WANTED—PARTS

Speaker/output transformer assembly for RCA 5T1. Copy or photo of back for Emerson EP-375 "5+1". Herman Gross, 1705 Gordon Dr., Kokomo, IN 46902 (765) 459-8308

Need ID plate for Western Electric SE-1071 Audion Control Box. Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 26606 (919) 851-1517 E-mail: ebell@nc.rr.com

Dial selector knob for Silvertone 6110 Rocket c-1939, black. Will buy parts set, if necessary. John DeLoria, 101 Doverbrook Road, Chicopee, MA 01022 (413) 593-1180

MUSEUM, *continued from page 76*

N9OO, is President of the JMS.

There has been much work on the database with all of the displayed keys properly accessioned and documented. We recently had a nice museum photo shoot with AWA'er and well noted key collector Russ Kleinman. Russ is preparing a wonderfully researched paper and last word on Spark Keys for inclusion in *AWA Review 14* now in the works. He was also very helpful in appraising some of the better items that are valued at over twenty thousand dollars each. Not bad for old on-off switches! There is a lot of work in progress studying the feasibility of moving the museum to a larger and more accessible facility. Three approaches; build where we are, build on the property we own adjacent to the Annex, or buy/lease an existing suitable facility and possibly sell the current annex. These studies are being presented to the Board of Trustees in May.

Finally coming to fruition is the multi-year task of bringing systems and procedures up to the standard required of a Permanently Chartered New York State museum. This requires changes in both the Club and Museum organization structures. The changes will be the subject of much debate at the May meeting of the Museum Trustees and the AWA Board of Directors.

The new museum brochure is complete and looks very nice. Our in-house photographer, George Platteter, AA2FO, came up with a cover shot that will just amaze you when you see it. We are also indebted to our long term museum guide and print shop owner Don Ray, WA2PKS, who did the final layout and printing at a cost to us that was probably a little less than his actual cost.

New Research Tool!

Index of *The OTB, The AWA Review,* and other AWA documents from beginning of publication through March, 2000. Available on either paper or 3.5-inch floppy disk (text format, searchable with your word processor). Introductory price: $9.00 postpaid for either version ($7.00 with any purchase of $19.00 or more from following page). Limited quantities—order today!

In closing for this visit, I need to recognize a real old timer in the best sense of the term. This gentleman was involved in the early days of the "barn" museums and has been a museum guide continuously for 25 years. He is retiring now, the stairs just too much for his tired legs. He is a true gentleman, a wonderful AWA contributor and I am a better person for knowing him. He is Richard Fish, W2OWF, of Rochester. Please say howdy and thanks when you see him at the conference.

S'long for now.... For your museum crew,

Ed Gable

Ed Gable K2MP/W2AN
Museum Curator

RECENT MUSEUM DONORS (compiled April 6, 2001)

Rosemary Domart (Estate of AI2W)	1930s rack TX, huge assortment of parts
Bob Roberts WA2QAU	General Radio 675H Standard (WSAY)
Jack Wenrich K2RY	Zenith Wavemagnet
Arthur Harrison W3HMM	Sargent 11-AA Receiver, as new
Fred Linn W9NZF	Bairdplex bug, Mfg Prototype Wouff Hong
Gary Brumbaugh	1930s telephones, meters, more
SCJ Associates, Rochester NY	H-P, Boonton, Tek & other test equipment
Sherry Kujawa	Outstanding Westinghouse H-169 Console
Alvin Ornstein	HQ-200 receiver & Spkr, as new condx
Russ McKay WA2CBU	A-K type 30 Rcvr and type TA Det/Amp
Fred Linn W9NZF	A-K Breadboard model 4700
Allan Pellnat KX2H	Two early transistor portables
Lucent Technologies	Cash donation
George Platteter AA2FO	Photographic Services
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MUSEUM NEWS

Hello all from your museum and your museum staff. Good to see Spring on its way again. Has been a tough snowy winter with more than one volunteer stuck in the Annex parking lot. Thank heavens for Morgan Wesson and his four wheel drive truck and a nice long tow chain. OK, lots to talk about so let's have at it.

This year's new displays represent a change to the museum look probably unprecedented in recent times. The biggest single item is the addition of two working radio teletype machines. These are a 1948 vintage Model 19 and a later 1960s Vietnam era green machine yanked right out of its T-195/R-192 shelter. You can type from one to the other across the room or be amazed at the awesome one-page-per-minute throughput time of the Model 19 reading from the punched-paper-tape message storage system.

I want to tell you, there is nothing like the sound of a well-oiled model 19 idling away in the background. Thanks to Duncan Brown, K2OEQ, and Allen Pellnat, KX2H, for their work in putting this together.

The "Made in Rochester" display also came along nicely with items ranging from 1924 to 2001. Be sure to look at Harris' new Tactical Handheld. hf through gHz range, all modes, Satellite and GPS positioning with video and data, yes, all in a handheld radio.

Mike Csontos has completely revamped the museum's audio distribution system so that the sound from various vintage horn and cone speakers can be demonstrated using nice early music from AWA recorded CDs. One CD channel feeds audio distribution and the other channel feeds station WAWA, on-the-air on 1210 kc, so that any radio in the museum can tune in vintage radio programs. The museum is pleased to be working with the newly formed James Millen Society (JMS) and will make available the Jim Millen AM transmitter for an on-the-air operating event during the Fall AWA Conference. The JMS will also have a display at the museum annex on Wednesday evening of the conference. See details elsewhere in this issue. Don Buska,

(continued on page 74